STATE OF CALIFORNIA

ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:

California Energy Commission/	)
Air Resources Board Public	)
Workshop on a California	)
Strategy to Reduce Petroleum	)
Dependence	)
	)

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

COASTAL HEARING ROOM

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INDEX (continued)

INDEX (continued)

P R O C E E D I N G S

9:44 a.m.

PRESIDING COMMISSIONER BOYD: Good morning. I think we've waited the customary ten minutes for all of the professors to arrive and what-have-you, so I think we -- I still remember those days --

Anyway, good morning, and I'd like to welcome you on behalf of the California Energy Commission and the California Air Resources Board to this jointly sponsored workshop. I'm Jim Boyd. I am the chairman of the Energy Commission's Fuels and Transportation Committee and thus earned the privilege, quote, unquote, of acting as a master of ceremonies for this workshop today.

I am very pleased to have with me up here the other member of the Fuels and Transportation Committee of the California Energy Commission, the chairman of the California Energy Commission, Bill Keese, and very, very pleased to have my good friend, the chairman of the Air Resources Board, Alan Lloyd, join us as well today. So on behalf of our two agencies, again, welcome.

The Air Board and the Fuels and

Transportation Committee are acting as your hosts for your joint agency sponsored workshop, thus is why you find the Fuels and Transportation Committee of the Energy Commission represented here, because we are the host committee for this subject at the Energy Commission.

We're here today, I almost want to say again because there have been a lot of these, to solicit and to receive your input on what I'll call the legislatively directed development of a California strategy for reducing petroleum dependence. A lot of work has been done. There is still quite a bit of work to be done to satisfy the legislative directives for this report, and input from all the stakeholders and affected publics is keenly important to this process and to us, both agencies in our efforts to finalize this work.

Assembly Bill 2076 directed the two agencies to develop and to submit to the legislature a recommended strategy on the ways to reduce petroleum dependence in California by 2030 and beyond, including goals for reduction. So that's been the thrust of the workshops. When this legislation was first signed into law, the

deadline for completion of this joint report was January 31st of this year.

All parties and the sponsors recognizing the complexity of this issue have acknowledged the need for more time, and Assemblyman Kevin Shelley, the sponsor and the author of the bill, expanded the scope of the report, as well as extended the period of time in which this report could be submitted to at least 30 days. And I emphasize the at least part of that phrase, 30 days beyond the original deadline.

And it's been my consensus expressed in previous workshops that we're going to need at least -- I mean, 90 days -- at least that 90-day period to complete this, because I think we all recognize the magnitude of the issue that is before us. And at that same time, the author requested the analysis go beyond the 2030 time frame as well, which is why I mentioned and beyond.

Today's Commission workshop is the fourth in the series of workshops that have been held on this particular subject, and it happens to be, I believe, the seventh in a series of workshops that have been held of late on the whole

subject of petroleum in California, its use, the supply for, the demand for, and the availability of components and so on and so forth.

Because, as many of you know, because I recognize your faces, there have been workshops on the subject of the establishment of a strategic reserve in California, as directed by the legislature, there have been workshops on the subject of state facilitation of or sponsorship of a pipeline from the Gulf State refineries to California as a result of legislative inquiry. And also, there was a workshop on the subject of the effect of the withdrawal of MTBE in California, the effect of that upon the supply of gasoline here in the State of California. So I believe, over the past weeks and months we have successfully not only lassoed but pulled out of the water the entire iceberg that is representative of the issue of petroleum use, supply and dependence upon here in the State of California.

So during this morning's session we're going to focus on the two staff's analyses of petroleum reduction options. Earlier this month the staff released a joint report on Task 3,

titled Petroleum Reduction Options, and we have invited specific comments on that report for today, although, once again, I'm going to assure you that this workshop is not your only opportunity to address this complex report. Because, per usual, the complexity of that report has led to its being made available on very short notice before this workshop, and our desire that you be given adequate time to read, review and comment.

During the afternoon session, I'm going to be, or we're going to be calling on our consultants from Arthur D. Little. They're going to discuss the proposed analytical approaches for the quantification of environmental or external benefits associated with reducing gasoline and diesel demand. Another draft report or Task 1, which is titled Benefits of Reducing Gasoline and Diesel Demand, is expected to be available sometime mid-April.

And having broached the subject of the schedule for reviewing this report and these proceedings, I'd like to begin and wrap up and talk about that schedule. It's obvious to everybody that the time frame, as I've said, for

this complex subject and completion of these reports is ambitious, very ambitious. In response to our concerns and numerous requests, we're going to extend the final, the schedule for finalizing the report through June of this year. So hopefully we're going to provide everybody adequate time.

So I would like to extend the deadline for public comment on the staff draft report until May 1st. The workshop for today's notice said April 12th, but I want to therefore point out we are hereby changing that date now to May 1st. And additional time will be granted on the Task 1 report that I just referenced, which is still under development.

So, again, I want to encourage your active participation in the workshop today. This is a complex subject, and I'd like this to be as informal as we can make it, and again encourage you all to please file written comments on this task report by the May 1st date.

Now, with that, I would like to offer Alan Lloyd, the chairman of the Air Resources Board and in whose facility we're having this workshop today, offer him the opportunity for a

few introductory remarks and then ask Chairman Keese if he would like to say anything, and then we'll return to the agenda.

Chairman Lloyd?

ARB CHAIRMAN LLOYD: Thank you very much, Jim. And again, welcome to this facility and it's delightful to have the chairman and you, Jim, here, and I think it's the first time I've sat with you in your new role as the new Commissioner, so a delightful addition to the Commission.

I must say, by the way, that you will notice additional security in this building. To the left and the right if you tried to get to the Board members, you've got to hurdle those obstacles.

(Laughter.)

ARB CHAIRMAN LLOYD: In all seriousness, that has been, I guess -- didn't start out that way, but I think this building is being modified for certain federal requirements, and I think what you see ending up here is hopefully not the final version.

I don't want to speak too long at all, just a couple of minutes, because it's very

important that we continue to move through the process of hearing how staff has advanced the ball, and to get some input from the public. And I would reiterate what Jim was saying, I think that as people are recognizing the potential implications of this report, then I think we're getting more attention, and I would anticipate this will happen through the next couple of months. Because I think it is fundamentally a very important study with, again, the potential for long-range applications and implications.

I think we only have to look back to the last couple of weeks in seeing the dramatic increase in gas price, I guess the most dramatic two-week increase in the last 50 years, to recognize how timely this study is. I think we were all a little bit into security here, and maybe the $1.60 assumption of gas prices looked pretty good, even a few weeks ago. I think today it maybe doesn't look quite as great.

And the other thing you see, even a threat, and the president saying he's going to go to Iraq has a ripple impact on gas prices. And I think as we look forward to the next 50 years, I think it's incumbent upon us in California, and I

think we have obligations to the citizens of California to try to provide some isolation from this constant see-sawing effect and the complete reliance on products from parts of the world which are not stable.

Clearly, in this study, as we will see, petroleum is going to be around for a long, long time. So it's not the case of running out of petroleum, but it's a case I think of being smart, to use it more efficiently, but also to look at the menu of options in fuels and technologies that we can apply. California is the place it can be applied, should be applied, and again, I'm delighted to be part of the group here working, to see if we can effect this over the time period that we're looking at.

And I'm a big believer, also, we have to look out at 2050. I'm certainly not going to be around to hold anybody accountable, but I think it's important, as we're trying to look at these technologies, to see what levers we can have to effect their introduction over that time period.

With that, I'm delighted to hand it over to Chairman Keese.

CEC CHAIRMAN KEESE: Thank you, Alan.

I'm pleased to be here and I'm actually very pleased that Jim Boyd was willing and accepted the responsibility of accepting the chairmanship of this Fuels Committee, which I have had for the last year or so. This is an extremely important issue and it requires a great deal of commitment. Jim's background allows him to bring his expertise and apply it to this issue.

We know that we're getting a lot more attention, we're receiving a lot more contacts regarding the report, and this is an important step along the way. We're working as fast as we can, but we do need your help to make sure that we have a very viable product when we're done here.

With that, I welcome you all here and let's get on with it.

PRESIDING COMMISSIONER BOYD: Thank you, Bill, and audience, don't believe a word he said. The junior member gets all the work. It has nothing to do with --

With that, I'd like to turn to the next item on the agenda, which is a program plan update, which is going to be brought to us by Mike Jackson of A. D. Little, consultant to the two agencies for this subject.

And I'll apologize in advance for my voice if it wavers, because I'm struggling with trying not to get the cold that's going around Sacramento these days, but it's winning its battle with me. So anyway, Mike.

CONSULTANT JACKSON: Thank you. Mike Jackson, Arthur D. Little, Accurex Environmental.

What I want to do this morning, and I know most of you have seen this program plan overview before, but again, we're going to go through an overview of the various tasks that we're performing, who is performing what, and where we are relative to status in the various elements of the task.

So what I want to do is, again, put this a little bit in perspective by giving you an idea of what the demand for gasoline and diesel is when you start projecting it out into the out years, talk a little bit about the roles of the various agencies, how they're playing in relative to the task structure, which I'll discuss next. And then talk a little bit about what we call Task 1, which is the ARB estimate of environmental and economic impacts. And then Task 3, which is the focus of this morning's conversation on the assessment of

strategies or what we're now calling options and costs. And then finally end with a schedule.

I've showed this before. What I'm showing here is fuel demand in terms of billions of gallons of gasoline equivalent. This is the on-road diesel and gasoline expressed in equivalent gallons of gasoline, and you can see in the -- today we're at about 17 or so billion gallons of demand, and that's about where our current refining capacity is.

And then in the out years, with growth projected for gasoline and for diesel, you have the increasing demand curve, and you can see the triangle there is what we're sort of faced with. How do we meet that demand in the out years? I've only shown here to 2030. When you show the 2050 part, that's even worse. So it keeps on going.

But there are three really sort of overall mechanisms that we can do to meet the demand. One, we can reduce the demand through a variety of options -- conservation, better efficiency vehicles. Another option is we could displace the demand, using alternative fuels like compressed natural gas, for example. And yet a third option would be that you could import the

product, the refined product into the State of California and use that to meet the demand.

So that's really what we're trying to figure out, is from a cost point of view and from an environmental cost point of view as well as a technology cost point of view, what makes sense. And that's what the analysis is about.

The various roles that are shown on this chart, again, the enabling legislation is AB 2076, authored by Shelley, which required these two agencies, the Commission and the ARB, to develop a strategy that would look at petroleum dependency. And we've kind of divided the efforts between on the left-hand side are the CEC or the Energy Commission's efforts to identify the various options, to analyze the various options, and then to perform detailed cost analyses.

And what you'll see when Dan goes through his presentation is that we have a lot of detailed estimates on cost and what the potential benefits are of the various technologies. Ultimately we're going to have to kind of integrate all of this to come up with a strategy that would allow us to figure out not only what sort of goals we could achieve, but also what

would be effective policy for California in the future.

On the right-hand side, ARB is focusing mostly on assessing what the environmental benefits are. So as you displace fuel, either through alternative fuels or you reduce the consumption of fuel, there is some benefit associated with that. And this afternoon we're going to focus again more on that detail and try to walk through the methodology for you this afternoon.

Combining the efforts is going to get us, as I stated before, the recommended goals, what sort of policies could we think about in terms of implementing those kinds of goals, and then ultimately a report goes to the governor and the legislature.

The task structure as shown here, the top parts, Task 1 has the benefits of reducing the demand for gasoline and diesel. Again, we'll talk about that this afternoon. Task 2 looked at really trying to figure out what the demand for gasoline and diesel, on-road gasoline and diesel are going to be in the out years, and a staff report was issued on that. I think there's one

out there on the table.

And Task 3, you now have a detailed report on that. We realize it's in draft form. As you can imagine, there's lots and lots of details in that report, and hopefully through everybody looking at it, we'll be able to make a better product out of it.

We are starting, just starting to think about Task 4 now, since we're moving through Task 1 and Task 3. A report on that will be out also later. And, of course, public input such as these are very, very important to us and to this process. And then that leads, then, to the recommendations to the governor and the legislature. And then shown on the right-hand side are the various reports we anticipate coming out of here.

There will be a report on the benefits of petroleum reduction, sort of the Task 1, which will be out probably early April, maybe mid-April at the latest. Volume two will be a detailed analysis of the options or strategies -- That you have a draft of right now -- and then volume three would be these policies and recommendations which will be, probably follow on to that, more in the

May time frame.

Just as an overview, this is Task 1. We've divided up the environmental and economic impacts to four different categories: air impacts, you see in the upper left, multimedia, economic, and other transportation impacts. Today, this afternoon we're only going to concentrate on the upper-left part of this, the air impact. And we're only really going to concentrate on how we calculated the emissions from the various options.

Subsequent to this we'll talk about how you value those emission reductions, and how you would come up with a dollar number. Multimedia we've also looked at. We presented some of this information at the last workshop, we're not going to repeat it here.

And economic impacts, this is looking at, we're going to use the general equilibrium economic model for California. It was built up by the Department of Finance, with help from the University of California at Berkeley. Those results will also be presented at a separate time. That effort is just nearing its completion. We haven't even seen the results ourselves yet, so as

soon as we do, we'll be able to get it back to you people.

And then there's other transportation impacts. When you reduce, for example, reduce the consumption of gasoline, there is this rebound effect in which you make it cheaper to drive vehicles and there is a tendency for the amount of driving to increase. So those kinds of things have to be included in our analysis also.

And then on various strategies or options, there's just a whole array of things that you've seen in the draft Task 3 report and Dan is going to get into this in detail. You'll notice in that report that there are various tools and technologies that we've tried to use to assess the various options, and this is the -- it becomes very difficult to try to do everything on an apples-to-apples basis, but we tried the best we could. Again, public input here and comments on this report are very important to us.

Finally, let me just talk a little bit about where we are on the program milestones. I think as you heard Commissioner Boyd refer to, we have extended out the schedule from where it was. The Task 3 report was released on the 19th of

March, and we're having the public workshop on that Task 3 report, although we have previewed it a number of times before.

The Task 1, we're hoping to get that out April 8th. I think that's doable. It may not have everything in it that we would like, but at least it will have the emissions calculation in its evaluation. And then we will have a public workshop on those results on the 15th, so we're not giving you a heck of a lot of time, but we're giving you some time at least to give us some inputs on the content of that report.

And then we're asking for final comments on the Task 3 report by May 1st. The first release of the Task 4 report, which will be the policy overview, will be mid-May. We'll have a public workshop on that sort of like ten days later or so, and then a series of public hearings on the final report, policy, and then formal either Board hearings or Commission hearings following that. So we're trying to wrap this up now towards the end of June, and that's our schedule.

So at this time let me turn it over to Dan Fong, who will walk through all of the details

on the Task 3 report, and again, it's a draft report. We're hoping that you all will be able to, at least for those technologies that you're interested in, take a really hard look at the details we put in here and provide us comments back.

You could imagine, there are a lot of details, even when we read it many times, our eyes get kind of glassy. So we're hoping your input will help us. Thank you.

PRESIDING COMMISSIONER BOYD: Thank you, Mike. While Dan is booting up his presentation here, let me take care of something I should have at the beginning and mention that up here on the dais with the three of us there is also Susan Bakker, my advisor at the Energy Commission, and Mike Smith, the chairman's advisor.

CEC STAFF FONG: Okay. As Mr. Jackson did provide some overview of the content of the staff's Task 3 report, there are numbers, numbers, and numbers. We've thrown in a few words to prevent premature blindness, but it's a hard thing to avoid.

So, again, I will be providing a summary of the Task 3 approach that we used to generate

the projected displacements and the various cost benefit comparisons that we're going to talk about. We are seeking feedback on the results of the analysis and I want to give everybody some conceptual description of the kinds of feedback that will be helpful to us.

I will describe the various petroleum reduction options that were evaluated, go through some of the key results from that analysis, particularly the demand, reduction or fuel displacement volumes that we're projecting in the out years. Some of the cost benefit comparisons that we are using to try to place these various options in some order to allow policymakers a better idea of what makes sense.

I'll talk a little bit about some of the timing considerations associated with these different options, and then we'll very briefly mention this concept of putting together portfolios of options.

The Task 3 analysis really is a comparative cost benefit evaluation. The Energy Commission's work was focused on what we call the direct cost and benefits. And so currently, the numbers in the Task 3 report do not include any of

the environmental benefits. That will be completed in Task 1, and at some point joined with the Task 3 results.

We estimate the gasoline and diesel fuel reductions from the base case forecast that the Commission also generated. We tried to determine the present value of non-environmental net direct benefits. And that includes net consumer costs and benefits as well as the impact that those options might have on government revenues.

In some cases we instead also show a net dollar per gallon of fuel displaced, where present value considerations are not easily applied. We also focus on two key analytic methodologies. One is using a consumer choice model that the Commission traditionally has used in transportation energy, but we also rely heavily on scenarios.

Well, how should you interpret the results that we presented in the Task 3 draft report? First of all, I think it's important to note that based upon the demand numbers that you saw Mike Jackson present, if we are to really reduce that demand curve, we really need a combination of both near- and long-term measures,

that no single option that we evaluated today has a large and immediate reduction that allows us to successfully reach a transition to a less petroleum-dependent future.

It's clear to us that the options that we evaluated using our consumer choice modeling, because of the more complex economic considerations in that model, we have some greater certainty in the relative magnitude of the net benefits that are being projected. And I want to note that the scenario evaluations, for instance, although they look at the incremental cost of technologies and the potential fuel savings that might accrue due to lower fuel cost, those evaluations do not place a dollar value on various vehicle attributes that we know are desired by consumers.

And so from a complete cost benefit standpoint, the scenario evaluations do not consider various consumer utility factors that normally we would also like to better understand.

Now, to make comparisons within the different groups that we assembled the analysis on, I think you can tell that those options that have positive net consumer benefits really reflect

the potential for market success. In those options where we're now projecting net consumer benefits, those choices give consumers increased utility. In other words, they're better off. If they have those choices to make in the future, they actually are better off in terms of their economic position.

But we also recognize that we are looking at many of these technologies today, and that we recognize that there are going to be future advances in technology. And when those advances occur, that will then change the potential projected net benefits. Because of the complexity of the group two options that we evaluated, there is greater uncertainty in the results of that analysis, and it is more difficult to compare the results of the group two options with the other group options that we're evaluating.

In seeking feedback from stakeholders and interested parties, we really want to know and hear from you about the assumptions that we've made and whether or not the comparisons that we're projecting are really fair. Although we want to improve the accuracy of our evaluations, I think

the key point here is that it's really the relative magnitude of the displacements and the cost benefit values that we're projecting that really bear on the final decisions that might be made.

And we're seeking or trying to get feedback on whether or not there might be different but supportable and applicable assumptions that might change the relative placement of the options evaluated. So we're interested really in the range of values that we're projecting, not the specific numbers that a particular option might look like today.

And so it's really important, for us at least, to know that those ranges are appropriate, and that those ranges properly or fairly determine the potential for these different options, in terms of reducing future petroleum fuels consumption as well as what those reductions might cost the consumer.

There are four primary groups of options, and I just list those here: Group one, fuel efficiency options; two are the fuel displacement options. Basically, group two looks at non-petroleum-fuel technologies. Group three

is a set of pricing options where opportunities we believe exist to use pricing techniques to influence consumer choice. And then finally we have this last group, group four, other options, where we also believe there can be meaningful oil reductions or fuel reductions in the future, but that those group four options sort of cover a much broader slate of descriptions than might be limited to the group one through group three options.

First I'll cover the results that we're projecting for group one, the fuel efficiency options. And there are five sort of key choices that we evaluated: improved vehicle economy, which includes quite a number of separate cases. We're also looking at the potential of using fuel-efficient replacement tires, and encouraging motorists to properly maintain tire inflation.

We're looking at the potential of deploying more efficient vehicles in government fleets. We want to look at the potential of reducing gasoline consumption through better vehicle maintenance practices, and we're also looking at the possibility of introducing larger numbers of light-duty diesel vehicles to replace

gasoline vehicles.

Now, in this comparison chart that I'm now showing here, we show the potential gasoline displacement for a number of these different fuel efficiency options. The bulk of these cases involve the vehicle fuel efficient option, and we're looking at different technologies and different costs to try to project future gasoline displacement.

For example, one of the options that we describe is full hybrid fuel efficient vehicles. That case essentially examines a new vehicle fleet that would average almost 46 miles per gallon, compared to today's 27.5. And so that would be a significant leap in light-duty vehicle fuel economy, but it also shows a significant future gasoline reduction.

Much smaller are the fuel-efficient replacement tires, the use of more efficient vehicles in government fleets, and again, improved vehicle maintenance practices. So from a magnitude standpoint, it's clear to us that from a fuel efficiency standpoint the largest gains can be achieved through more fuel-efficient vehicles in the new vehicle fleet.

I also want to show how those different fuel economy cases might look over time. Earlier, in Mike Jackson's presentation he showed you a demand curve. We've also shown this curve on this diagram. That's the upper line here. And the result of these different fuel economy cases that we're examining are then shown below.

The first line below the baseline demand case is a case using the Energy Commission's consumer choice modeling program. It uses vehicle inputs that we obtained through our consultant, EEA, and it basically shows the effect of gasoline reduction as vehicles are introduced over the 2008 to 2020 time frame, where those vehicles improve in fuel economy from 27.1 out to roughly 35 miles per gallon.

And so the other cases, which are more aggressive, in terms of their new-vehicle fuel economies, show increasingly larger demand effects. But the thing I think that's important to note in this diagram is that in the out years, starting at around 2020 out to 2030, all of these very aggressive fuel economy strategies that are options being to result in an eventual increase in future gasoline demand. That tells us that there

is a limit to the overall fuel consumption impact that these very aggressive fuel economy standards might have.

And so if we're really interested in reducing the long-term consumption of gasoline, we also have to look at potential other options, in combination with these very aggressive fuel economy options.

So on the flip side, we're also looking at light-duty diesel vehicles. And I'm showing this separately because this particular option does involve essentially the increase of petroleum fuel on the one hand, because we're simply substituting gasoline vehicles with diesel vehicles.

And so when we do that, the upper bars show what the gasoline effect is, that yes, we have a fairly significant reduction in gasoline demand in the future, but at the same time we're going to substantially increase the use of diesel fuel. And so the lower three bars actually then adjust the gasoline reduction and the diesel increase with some considerations at the refinery, where, for instance, it takes less energy from a barrel of crude oil to produce a certain volume of

diesel, as compared to an equivalent volume of gasoline. Nevertheless, what this shows here is that this particular technology, although it can reduce gasoline substantially, does not necessarily result in a large decrease in petroleum consumption.

The cost comparisons for group one fuel efficiency options are displayed on this figure. Those on the right-hand side show net consumer benefits; that is, the consumer is better off in those cases. Our current analysis, however, is showing that in the more aggressive fuel economy cases, the value of the fuel savings in those cases does not offset the higher incremental costs for those more aggressive fuel economy cases.

But I do want to point out that the analysis that we employ for those more aggressive fuel economy cases assumed that those incremental costs were fixed over time. In reality, we probably know that those costs come down as the industry learns better how to deploy those technologies. We're also assuming in all of these cases that the cost of gasoline remains fixed over time.

ARB CHAIRMAN LLOYD: Dan, can I ask you

a question now. Given what you see here and your caveat, what would the price of gasoline have to be so that, for example, the Honda or the Prius hybrids that are currently on the road would break even?

CEC STAFF FONG: Well, some preliminary numbers that we've looked at show that for that particular incremental, for that particular car which is roughly $4- to $5,000 over, for instance, a comparable compact sedan, like a Corolla, it would probably take a gasoline price on the order of $2.50 up to $3 a gallon for that technology to pay for itself in terms of fuel savings in today's economics.

I think as -- I'm trying to describe here, though, that, one, we know that over time the cost of thaws technologies will come down in time. We're looking at these things from a modern-day perspective, which generally tends to over-project those future costs, simply because there is not enough real-world experience in manufacturing and deploying those technologies in future vehicles.

It's similar to, like the emission controls that we now have on all of our gasoline

cars, early costs for those emission controls are reflected much higher costs than what they are today. And so we believe that in the future, these more aggressive fuel economy technologies will also come down in their costs.

And I think that in a subsequent volume, after we get additional feedback from interested parties, we hope to refine this analysis, incorporate some more reasonable cost functions, so that the cost benefit that we project for some of these more aggressive technologies are more realistic. I think what we're showing here is a worst-case.

Another difference that I want to point out here, if you look sort of in the middle of this chart where we're showing what we call the CalCars/EEA case, it shows a certain cost benefit. And I think that case, in terms of the fuel economy, compares with the second bar there, which is called the advanced fuel efficient vehicle. That second set of bars has a light-duty vehicle fuel economy that peaks at roughly 35 miles per gallon.

The CalCars/EEA case peaks at roughly the same fuel economy, and yet the displacements

are different, or the net consumer benefits are different. And the reason for that is the CalCars model has more complex metrics, it's better able to calculate how consumers fully benefit from having additional vehicle choices in the marketplace, whereas the scenario that was developed for the other fuel economy cases do not contain those various attributes and, therefore, cannot really fully account for the full slate of consumer benefits that come from having additional vehicle choices in the marketplace.

Also, I want to point out that in the scenario cases, again, from an initial sort of evaluation standpoint, those new vehicles in those other cases were all introduced in a single year; that is, in 2008, all new vehicles either would make this very swift leap from the current 27.5 mpg up to any one of those numbers that we show next to those cases.

So we recognize that that also is somewhat of an artificial phase-in, that typically the automotive industry requires several model years to fully incorporate new technology so that these technologies are available across their product line. And, again, we hope in the next few

weeks to introduce that additional complexity in our modeling so that we, again, can project more realistic net benefits as well as ultimate gasoline displacement values.

But I think these numbers do relatively place these different fuel economy options in a relative manner, that there are clearly a number of these more aggressive fuel economy cases where the consumer is better off. And from a starting point, those are the ones that we should look at.

Today, we can certainly say that going up to 35 miles per gallon is a no-brainer, that consumers benefit, that it may represent a challenge to the automobile industry to build those kinds of car, but from a net consumer benefit standpoint, they're better off.

In the group two, field displacement options, we have a whole list of non-petroleum-fuel options which we believe merit consideration in the time frames that we're examining. And I have a slightly misplaced chart. So I'll go back to this later on.

But I want to sum up the group one options in terms of their timing. It's clear to us that options 1(b) through (d), which are sort

of the state-controlled fuel-efficiency measures that we looked at, that those could be implemented int he near term with either executive office directives and/or local government cooperation.

But the more difficult ones are what we categories as the mid- to long-term options. Those all include the option 1(a), vehicle fuel efficiency cases. And then we also believe that the option 1(e), which is the light-duty diesel case, requires significant emission control and development in order for the light-duty diesel option to be successful here in California.

Now, going back to group two, I'm showing here some fuel displacement projections for the different technologies. Now, one of the things that we had to do for group two, because they all involve technologies that are at different stages of development, we assume that all of these technologies at some point, with continued research and development, investment and progress, that they can reach some mature market condition. And so these fuel displacement values are all projected based upon that mature market condition.

And we also arbitrarily assumed for most

of these cases, with the exception of one here, that they could achieve at some mature market condition at least a fleet population equal to ten percent of the state's vehicle population for light-duty vehicles. That's why those bars for all of these options relatively peak out at roughly 20 billion gallons in the 2030 time frame, because of the assumption that we make.

However, for the option 2(f), which is the E85 and alcohol fuel vehicles, we allowed that case to go higher, simply because we recognize that that technology does not really require a lot of development, and that it is being pursued by the automotive industry as a strategy to help them meet corporate average fuel economy standards. And so in that case we believe that in 2030, they could easily achieve a higher vehicle population.

And so for that particular case, we're showing a slightly greater vehicle displacement, although I think in the out years especially that particular displacement probably has just the same potential meaning as the other cases that we examined in this group.

Now, we added an additional case here that we did not originally talk about, and that's

2(g), which is the use of E10 in gasoline, and that is currently an option that isn't part of any ethanol blending strategy here in California. Due to the phase-out of MTBE, we anticipate that in the future at least a large fraction of our gasoline in California will contain at least 5.7 to 6 percent ethanol. This case looks at the potential of blending ten percent ethanol in gasoline.

ARB CHAIRMAN LLOYD: This will go out to 2050 eventually?

CEC STAFF FONG: Yes. We eventually would like to make some projections of the fuel displacements out to 2050, although again, given the difficulty for us to really predict what the price of gasoline might be in that time frame, it tends to make those numbers less certain in those time frames. But we can certainly show the magnitude of the displacements in that time frame.

ARB CHAIRMAN LLOYD: I wouldn't hesitate to say I doubt whether the uncertainty just resides only with the price of gasoline. I think there are a lot of things.

(Laughter.)

CEC STAFF FONG: Yeah, exactly.

Now, the fuel displacement options, when compared from a cost perspective, again, because these technologies, some of them are closer to maturity today than others. Others are actually probably ten years or more from reaching any kind of a competitive market condition. We're showing a variety of different cost comparisons on this particular chart.

Now, if you're looking from your handouts, you don't see these colors very easily, obviously, and so it's a little more difficult to read, but if you sort of focus up on the screen here, we have two types of candy striping -- one goes to the right, the other goes to the left, and so you have to keep that in mind when you're looking at these different bars. We also attempt to show what we call an intermediate market case, where some technologies are now currently beginning to compete, but we recognized that in order for those technologies to gain larger market shares, they will continue to need either performance enhancements or cost reductions.

But from the current analysis we've done here, it shows that there are some of the group two technologies that make sense from a consumer

standpoint. And that means that those bars that cross over to the savings side imply that at some point, when those technologies reach what we believe are mature market conditions, they can provide consumers with some potential savings over the use of a comparable gasoline vehicle.

But on the other hand, there are a lot of other technologies at this current point in time which don't look that attractive. And so if we want to see those technologies gain larger market shares, then something has to be done on the cost side. Some policy or initiative would have to be put into place that neutralizes those higher costs so that those technologies might compete in the marketplace.

ARB CHAIRMAN LLOYD: Dan, can I -- I guess it occurs in Task 2, but I'm really only asking when you look out that far or look out that, further ahead and look at the demand, and then you look at the rest of the world demand, how does California's demand then stack up as a percentage of demand for the rest of the world?

CEC STAFF FONG: In terms of the, our petroleum fuel consumption?

ARB CHAIRMAN LLOYD: Yes, because

obviously, as you look at the developing nations, their demand is going to be growing much faster than ours. So you're overlaying this on the overall global issue, and so how -- trying to keep it simple, if we've got X percent of the world's market now in California, what will that be in terms of future years, and obviously, what, the absolute magnitude.

CEC STAFF FONG: Yeah, we actually have not --

CEC STAFF FONG: That would be in Task 2?

CEC STAFF FONG: -- looked at that aspect, although I understand your thought there, that because our current demand is probably plateauing, that the demand for petroleum fuels in developing countries is growing at a much, much higher rate, and because of population, if you look in Asia and in Africa, historically we recognize that as countries improve their economic condition, in general, people value personal mobility. And historically, all of the various experiences in other countries show that the ownership and operation of personal vehicles will begin to become more and more important.

And so, from your perspective and ours, that means the demand for petroleum fuels, particularly gasoline and diesel, will probably increase quite rapidly as those countries develop and begin to compete head to head with the developed nations. And so it's likely to put even more demand-side pressures for those of us here in California who still might be using gasoline or diesel as our primary energy resource for transportation.

PRESIDING COMMISSIONER BOYD: I believe that's an extremely relevant question, particularly taken in the context of all the other workshops we've had, as we've discussed supply and demand for fuels within California and then within this nation, and the nation's ability to meet California's needs has to consider the nation's ability to meet its own needs.

And, for those of us who have been around a long time -- I don't mean you, Alan -- and have seen a lot of the data presented by a lot of people that we mutually know about what's going on in the world, and Dan said it right, the world has now for decades seen a demand for mobility that has been met by fairly crude means. As the

greater demands for shelter, food and health have been met, the demand for mobility begins to shift to motorized vehicles. And I think the world has a worse single-occupant-vehicle ratio than we do, or it's getting that way.

The worldwide demand for the scarce diminishing resource, petroleum, may be an extremely important question that the nation and the State of California is going to have to wrestle with, so a very good question, a very good issue.

CEC STAFF FONG: One other thing I'd like to point out in this particular figure here, if you look at the last two bars on the chart, we put the light-duty diesel case on this chart, even though it's on group one, and we did so because of the analytic methodology that we use to evaluate the pros and cons of that particular fuel efficiency option. And, as it shows here, compared to some of these other fuel displacement options, it's relatively expensive in terms of net dollar per gallon of fuel displaced.

And the reason that is, is that for these vehicles -- based upon our current projections, for these vehicles to meet California

emission standards, additional technology will have to be applied to those light-duty vehicles, and due to the range of incremental costs that were determined in our analysis, it results in a fairly large dollar cost per net, per gallon of gasoline displaced. And so from that perspective, the light-duty diesel vehicle does not compare very well, in terms of a gasoline displacement strategy.

Now, what are some of the key points to keep in mind when you're looking at these results for the group two displacements and what some of the uncertainties are? Well, again, I want to remind the audience that the market penetration level that we used to determine the displacement was really not an estimate of market size, that we artificially assumed that at some point, if these technologies reach a mature market condition, they can at least achieve a maximum ten percent light-duty vehicle population.

But we recognize that the actual penetration level will depend on the perceived values to the consumer; that is, what might be the incremental cost of those vehicles, what might be the fuel savings, are there other factors like

fueling inconvenience that might discourage consumers from selecting that particular non-petroleum-fuel option? We recognize that nearly all of these group two options will require some break-even condition in terms of owner and operating costs in order to overcome some existing market inertia for change.

And then finally, for many of these group two options, reaching that mature market performance and cost level will require sustained investment. And so if those investments don't continue to occur at the current pace or if they're not accelerated, then obviously the projections that we made based upon the assumptions that we made today will result in different displacements and potentially different cost comparisons.

But at the same time, we recognize that as technology advances, the performance of these group two options will improve, cost reductions will be achieved, and so again, we expect that if we were to reevaluate these technologies in some future time frame, we'd have lower net dollars per gallon of gasoline or diesel displaced.

And then lastly, as I earlier said, some

of these current market, mature market projections do show the potential for a self-sustaining market success, that at some point in the future, if those performance goals and costs are met for those developing technologies are actually achieved, then they look very competitive compared to existing gasoline and diesel vehicle technology.

CEC ADVISOR SMITH: Dan, I do have one question. On the assumed penetration area of ten percent for the developing technologies, you made the same assumption for the light-duty diesel technologies also.

CEC STAFF FONG: Correct.

CEC ADVISOR SMITH: Is there any existing forecast or any other data or information that we could rely on regarding diesel penetration other than just an assume ten percent? In other words, you're comparing penetrations of light-duty diesel with, for example, fuel cells that haven't even been developed yet or commercialized. Is there some other experience or data we can draw on for the penetration of light-duty diesel that would be more realistic for this category?

CEC STAFF FONG: Well, I can answer that

with a yes and no answer. First, the difficulty that we found in trying to develop some more realistic vehicle penetration rates for the light-duty diesel technology, it really hinges on the incremental vehicle cost that was calculated in our review of the technology that might be required to meet California emission standards.

Those relatively high vehicle incremental costs then really affect the potential market penetration that might be achieved in the marketplace. In one review that was conducted by the Department of Energy for their internal R&D programs, they also projected a light-duty diesel vehicle penetration rate in the future that would reach roughly 20 percent of the light-duty vehicle marketplace. But that car had an incremental cost of roughly half of that that was used in our analysis.

Therefore, I think that the DOE analysis probably is an upper bound, which plateaued at roughly 20 percent of the light-duty vehicle market in the future. And so assuming a ten-percent vehicle penetration may not really be that bad.

In England, for instance, where emission

standards are not as stringent as in California, the United Kingdom has achieved a light-duty diesel vehicle penetration rate of roughly ten percent. And so ten percent may not be that far off the mark if these costs are accurate or the range of costs that we used are somewhat near where they will actually be.

So if the life cycle cost of the light-duty diesel technology is attractive, then yes, consumers are likely to buy that technology in greater numbers. And that's sort of the outcome that Europe has experienced. Because of very favorable fuel taxation policies in France and Spain and some of the other European countries, light-duty diesel sales have approached 50 to 60 percent. But in England or in the United Kingdom where those favorable tax policies are not as favorable, they've only achieved a ten-percent market penetration in that area of Europe.

So it really depends, I think, on how the consumer is going to look at the light-duty diesel technology in terms of potential savings. There is this added cost. The diesel engine itself costs more than the gasoline engine, and then when you tack on the cost of the emission

controls, that's an additional hurdle for the consumer to overcome in order to make that purchasing decision.

ARB CHAIRMAN LLOYD: And I'd also say, at least for the UK and maybe other parts of Europe, where you get maybe one out of three new car sales are diesel, there is a very high percentage of company cars in the UK, way over 50 percent. So I think you'd also have to look at that, and the company -- typically, companies dictate that they buy diesel cars because of the greater fuel economy, although the English cost up front is -- so I think it's -- we have to be careful about doing some of that comparison there, so -- but there's still no doubt it's an increasing trend.

PRESIDING COMMISSIONER BOYD: If I might, just kind of a personal observation of light-duty diesel experience in the nation and State of California, I just personally think diesels face, light-duty diesel faces a very steep slope in California, just from the experiences Californians have had with light-duty diesels during one of the energy crises, for one.

For two, maybe future generations, but

those generations still in California who never did like the black smoke, and although you don't see it today due to fuel and technology increases, still the memory is long. And thirdly, the debates about diesel and exhaust toxicity in California over the years, I think all add together to give diesel quite a fairly significant challenge.

And then, the last I would say is both America and California are not Europe, never have reflected the attitudes and tastes of Europe as it relates to vehicle choice. And with apologies to my friend from the British Isles, the Boston Tea Party had something to do with government tax policies, and this country has never been really willing to use that as an instrument to -- not completely, but to facilitate social change. I know, I've sat in Alan's organization for years as we struggled with those questions.

So, in any event, not to dump on the question, just to lay out the realities of the situation, and I've had these discussions with representatives of folks that I'm very neutral on the subject, and I know Alan and I come from the same technological standpoint, that the standards

are there, meet the standards and it's a level playing field. But human behavior and the behavior of Californians are often left out of model calculations and computations, and that has to be taken into account, so just a personal observation.

CEC STAFF FONG: Okay. Our next slide here briefly discussed some of the time considerations that are linked to the group two options. We have quite a number of options which actually are very close to sort of reaching this competitive market threshold. We believe that, for instance, compressed natural gas and light-duty vehicles, the increased potential use of LPG in medium-duty vehicles, for instance, is potentially very positive for sort of site-specific opportunities.

But, in general, these options, in order to go beyond their current market impact, are likely to require some additional support, either to reduce the cost of the fuel or support the deployment of infrastructure, simply because the number of vehicles that might access fuel through a retail outlet is still relatively small.

And so, from an infrastructure

standpoint, if you want to see these vehicles or these kinds of vehicles enter the marketplace in greater numbers, then you're going to have to improve that infrastructure, reduce that infrastructure cost to a point where retailers can actually recover that investment for that infrastructure cost.

Now, group three, some of the pricing options we looked at, imposing a gasoline tax above and beyond what we currently use. We recognize that by increasing the cost of fuel, we can discourage use. We also looked at some of these more creative strategies, like pay at the pump auto insurance. And so basically what that does is it changes a fixed cost to the consumer and makes it a variable cost. That variable cost is then more closely tied to usage. And so in the longer term, consumers are going to pay attention to that cost over time, and, therefore, the influence here is that you drive less because you actually see the effect of having to pay more when you drive more.

Now, when we compare these pricing options in terms of their gasoline displacement potential, one of the most favorable options, in

terms of the results, is a feebate case. And that is shown in option 3(d). We have two different cases there. One looks at a state feebate where there is some limited automotive manufacturer response to that feebate program; in other words, the automotive industry will either sell or introduce higher fuel economy vehicles in California in response to that type of feebate policy.

But the greater benefit occurs if the effect is a nationwide impact on vehicle choice, and compared to, for instance, the next largest displacement, which is a gasoline tax. The feebate case, which is really a revenue-neutral opportunity there, the feebate case more than doubles the potential future gasoline displacement.

Now, from a consumer perspective, how do these pricing options compare? Again, the feebate cases show large consumer savings in the out years. And so does purchase incentives for efficient vehicles and pay-at-the-pump auto insurance has a much more modest effect, but nevertheless a positive effect. Sort of the losers, if you want to call them that, involve

various taxes. Taxes generally cost consumers, and don't necessarily provide them with net benefits.

Also, we had a sort of a similar concept associated with vehicle registration fee transfer that is similar to like a pay-at-the-pump auto insurance where, instead of paying an annual fixed vehicle registration, we transfer that vehicle registration fee to an additional pump price. So, again, changing a fixed cost to a variable cost, but that had a very, very modest effect. It's almost like a little pimple on the curve here.

So it's positive, but it may not be really worth a whole lot of effort to pursue that particular option. Again, if policies are adopted, these group three options really have some near-term fuel reductions, and there are many that actually have positive net consumer benefits. So the consumer is better off, and we can get some immediate fuel reductions due to the implementation of the policy that might drive those particular options.

But that might be the more difficult thing. Many of those options that we evaluated in group three will require the enactment of state

legislation.

Finally, group four, which is sort of the catch-all category. We believe that all of these different options in group four, or at least a good number of them merit some consideration in the policy debate that is likely to follow the staff analysis. These are much more difficult, though, to get your hands around in terms of the potential displacement and the particular costs associated with these different options.

We could probably spend a couple of years on land use planning alone, to sort of figure out how state policy might be changed to improve the current land use planning outcomes, where instead of the sprawl that we have today in growing communities, we can somehow develop communities that don't require you to get into a car to get to someplace that you need to get to.

From my gasoline estimate, again, I want to -- of all of the groups I think that our estimates in group four are probably the most nebulous. We want to be realistic, but at the same time optimistic that these particular options might result in reduced future petroleum fuels consumption. So the largest one that we currently

project is that if somehow, if policies are adopted at the local and regional level for land use planning, there is a potential reduction effect.

And if it's done right, there may really be no costs associated with those kinds of land use planning decisions. It could be a free ride for people if, you know, future growth strategies are adopted that provide consumers with the same access of mobility and the access to goods and services that they are currently accustomed to, but that does not require them to get into an automobile, then everybody is probably better off.

One of the interesting results for option 4(e), which is a voluntary accelerated vehicle retirement, which some people call scrappage, that actually results in a potential increase in gasoline consumption. And the real reason for that is that if you retire essentially an old vehicle, that vehicle generally is not driven very much to begin with. And then you replace that old vehicle with a slightly newer vehicle, that newer vehicle tends to be used more than the old vehicle. So even though the newer vehicle may have better fuel economy than the

vehicle that you retired, the net effect is more driving, and more driving generally means more fuel consumption.

PRESIDING COMMISSIONER BOYD: Dan, before you move away from that chart, let me, if I might, just make a comment, again almost a personal observation. I very much appreciate the caveat you put on the sophistication of the analyses that have gone into these options, or, i.e., the need for more work in this area. I agree, it's a very nebulous area. And I'm personally disappointed that land use planning doesn't, you know, rate a better cost effectiveness, but I know it's a product of all that we just talked about.

My personal feeling from 40 years in government is that land use planning is -- poor land use planning is almost original sin with regard to what hails our society in many environmental and social areas, and I only hope that more attention can be placed on the subject in the future, but it's a difficult one, it's dealt with at the lowest of local government levels, and it's subject to the wiles of two-year terms of office and local influence and what-have-

you.

But it really needs to be better integrated into our future. We wouldn't be dealing with a lot of the issues we deal with, with regard to civilian citizen encroachment upon industrial areas where they really have no business living, as well as driving distances and a lot of the other things that influence and affect some of the problems we're trying to solve now. But nonetheless, as you said and as I will reinforce, this is a subject for those who follow us to, if not right now, for folks to pay a lot more attention to.

And unfortunately, it doesn't appear that we're going to be able to put much of a focus on this in our report to the legislature with regard to the hard data that's been analyzed, but maybe in our narratives we can point out the real need for others to engage in even expanded research on this subject in order to better answer the question, get better data and maybe start addressing some of the issues.

Anyway, just, again, a comment. Thank you.

CEC STAFF FONG: So to sum up the group

four results, in option 4(a) we tried to look at the current transmit system, public transmit system operation. But the way that we evaluated that in sort of this very broad-brush generic perspective, it really doesn't look at individual transit property opportunities where ridership or usage might be increased in a relatively easy way.

And so I would certainly suggest that if there's a follow-on effort, that more detailed evaluation be performed. But it would require almost a site-specific property-by-property reevaluation of how those systems currently reach out to the community to encourage, you know, consumer usage of that transportation option. But, again, consumers' response to those kinds of initiatives is very uncertain.

Four(b), as I mentioned earlier, the advanced land use policy option, there are so many fiscal issues that are inherently tied to local land use decisions. The fact that most jurisdictions want local control, do not want another outside body entering into that realm of decision-making. It really makes for a complex challenge to reduce the current rate of vehicle travel and automobile use.

And then lastly, as I said, option 4(e), the accelerated vehicle retirement, of all of the group four results, it didn't really show a very positive outcome. And I think the outcome, though, does make some sense that just because you take an old low-fuel-economy car out of service doesn't necessarily mean you're going to reduce your future petroleum consumption.

Lastly, it's clear to us, the staff, that we need a portfolio concept here if we're really going to make some impact on reducing our petroleum dependence. Some combination of these options, based upon the work that we've done, really can show that large reductions in gasoline and diesel fuel are possible. Having a menu of options also really provides flexibility for future changing conditions.

Having more than a single option or a small number of options really reduces your risk and uncertainty for achieving your oil or gasoline and diesel reductions in the future. It's very important, though, that these options or these portfolios really provide consumers with additional choices.

And then finally, some combination of

these options can not only have some near-term effect, but they can also have this longer-term benefit which we absolutely need to have. You need to remind yourself of the demand curve that Mike Jackson showed, and also the curves that we showed displaying the effect of advanced fuel economy, that at some point in time in the future, because of population growth and economic expansion, our need for transportation energy continues to increase over time.

And so having this sort of portfolio of options, some that address the near and mid-term needs, but also, we need to make those investments so that options are ready to be deployed in the longer term and in the out years.

We're happy to take any questions, and if you'd like to go to the center podium there, please state your name and the organization that you're affiliated with. This is one microphone there for our recorder, and then the microphone for the public address system here.

PRESIDING COMMISSIONER BOYD: Thank you, Dan, and just let me reiterate his invitation. We've now reached the point on the agenda where we're going to spend at least the next hour,

hopefully, in a question-and-answer session and a public discussion. This is supposed to be a somewhat informal workshop on the part of these agencies, so I again invite the participation of the stakeholders and the interested public.

And that reminds me, as folks are coming to the microphone, of Chairman Lloyd's questions earlier regarding the constancy of the cost of gasoline at I believe $1.64 a gallon in the analyses, and the lack of inclusion of an experience discount or a learning curve in the cost of technology.

And Dan, your answers or your discussion of that, i.e., we need input on that subject today and in the future and staff's plans to update this very important component of what is going to be this discussion and this report are very relevant points. I'm reflecting for myself, and I'm sure the experience Chairmen Lloyd and Keese are the same. The ability of industry in this case, particularly the auto industry, to engineer efficiencies has been historically undervalued or underestimated.

And, frankly, after this public comment time period passes, I would look forward to and

expect to see a positive adjustment in the fuel efficiency and fuel displacement option calculations in some areas. So, again, that's an area where we really need some discussion and input, and I look forward to it.

With that, to the audience.

SPEAKER POHORSKY: Thank you very much. That was a good report, Dan.

I'm Jerry Pohorsky, concerned citizen from Santa Clara. Today I actually did a little bit of ride-sharing and carpooling. Michael Schwabe and myself came up in his EV1.

And what I'd like to just emphasize is in order for this portfolio of strategies to be successful, what really needs to happen is we need to remove the barriers. Right now, in terms of the E85, the barrier is, there is no fuel. Right now, in terms of electric vehicles, the manufacturers simply are not producing the vehicles in sufficient quantities.

I believe it's very easy for one out of ten people in this room to be driving an EV, especially those that have two vehicles in their household. And similarly, the flex fuel vehicles that are already on the road, I believe it's very

easy for government fleets, for example, to go exclusively with these alternative fuel vehicles.

I see so many Ford Tauruses on the road with these FFV logos, and yet there is no place for them to fuel up. And yet, there are other government vehicles that are not the flex fuel variety, and why? There is really no reason why they couldn't be.

So I think there are some -- You talk about near-term and long-term solutions. In the near term, those are two vehicle technologies that are mature, ready to go. Maybe in the case of the EV we do need some subsidies. Certainly, I'm benefiting from the subsidies there, and without them I don't think I could afford that option. But when the subsidy is there, it's a very viable option. The displacement is 100 percent.

Thank you.

PRESIDING COMMISSIONER BOYD: Thank you.

ARB CHAIRMAN LLOYD: Again, I see Neil at the back. I'm sure he's looking at the prospective customers.

PRESIDING COMMISSIONER BOYD: He likes to back cleanup in testimony of those too.

SPEAKER MC CANN: I'm Richard McCann.

I'm with M. Cubed. I've spoken before you several times for the Diesel Technology Forum, and I have some general comments ultimately leading to how you might frame this analysis for your Task 4 step that you have to undertake.

First off, I again want to commend the staff for the work they've done. The way they're approaching this analysis is really excellent, in terms of looking at the range of uncertainties, all of the values that are incorporated, consumer demand, all of those factors. I think it's really important and valid to do this type of analysis, and I really urge that both the Energy Commission and the ARB continue this type of analysis in the future and using this type of framework, because I just think it's extremely useful.

But saying that, I also want to say that I'm a quantoid, and I'd like to have more tables and documentation in the report. But that's something I can discuss with the staff, in terms of getting that information.

But I want to step into --

PRESIDING COMMISSIONER BOYD: That's a new term. I'm still -- it's going through my --

SPEAKER MC CANN: Yeah, well, it comes

from -- Yeah, when I was in policy school, there were the policy-wolicy people and the quantoids. And I was a quantoid, so --

(Laughter.)

SPEAKER MC CANN: In terms of framing the analysis, you've got this analysis that you've done for Task 3 and that you're going to do for Task 1, and I want to go through some things I think that you need to do in terms of structuring the Task 3 analysis and the Task 1 analysis so that it's useful for the Task 4 analysis.

And the first thing is having realistic assumptions about the technologies, and that is how costs change over time. A lot of this analysis uses a point, some uncertain point in time future costs, you know, mature technology costs. Well, there are actually significant costs of getting to that point. That's one of the reasons why we haven't gotten to that point in many cases is that the initial costs are so high for getting to that mature technology cost.

The second one is about market penetration assumptions and relying on real-world experience. I know we talked about light-duty, or you talked about light-duty vehicle assumptions.

It's important to remember that California, in 1984, 14 percent of the car market was light-duty diesel vehicles. That was 16 years ago. It was air quality regulations that ended that. But there actually has been great penetration of light-duty diesel vehicles in California.

And in terms of looking at assumptions versus CNG or LPG cars or other fuel cell cars, we have real-world experience with light-duty diesel vehicles, and you should use that in looking at your assessment. You have some real-world experience with CNG vehicles in the fleet. You should look at that experience, in terms of making market penetration assumptions. You shouldn't make across-the-board assumptions about market penetration for all technologies. You need to look at individual technologies and the characteristics that they have.

One suggestion I have is for light-duty diesel vehicles, it's really easy to put them into the CalCars model and see what the answer is at the back end. All you have to do is ratio the fuel price. And otherwise, you have all the characteristic information. Just put it in, see what happens.

Another point that I want to say is that you need to focus on net petroleum reduction. There is in those tables net gasoline reduction. And the thing is, is that, in fact, you have 42 gallons of petroleum in a barrel of crude oil. You can only get 42 gallons of gasoline or 42 gallons of diesel out of that. It's not as though you can get 35 gallons of diesel out of crude or 37 gallons of gasoline out of crude, you get 42 gallons.

And then you lose some energy content out of those gallons as you go through the refining process, making adjustments, energy adjustments between gallonage, which occurred in doing the analysis of diesel versus gasoline is incorrect, that's a math error. And I'll talk to the staff with greater detail about that. But I think that you need to focus on petroleum reduction, not gasoline reduction, in doing your analysis.

Then another point I wanted to make is about focusing on near-term options, and those are options that really can be influenced by state policy. That is, is actions that legislators today can take. You need to -- I think that it's

unclear in this document whether it's about proposing near-term policy actions or it's about creating an R&D plan.

And the fact is that if it's an R&D plan, you need to look at what's happening at the national level and what sort of strategies we're going to have at the national level. California, even though we're a big economy, we're still dwarfed by the United States, in terms of our economy. And you need to look at what is going to happen in R&D at that level.

So I think that as a recommendation to legislators, today's legislators, not the children of those legislators -- who may be termed out by the time we get to the implementation of these technologies -- you need to stay focused on what you can do in the near term and what technologies and what policy options are available to you in the near term. And it's not so clear in the report as to what things, what actions are available to them.

And that brings me to my final point, is that I think that you need to identify policy options, the policy actions that are necessary for each one of these strategies to take place, and

identify the external or exogenous events which will affect the costs and successes of these strategies.

For example, as costs develop over time, it's not going to be some deterministic path that the state legislature or the ARB or the CEC are going to have control over. Those cost trends are going to be factors that you have no control over. Technology will evolve as you go along, and so you need to clearly identify what are the actions.

I envision, in fact a set of bullet points at the top of each of your chapter: list of policy actions state legislature can take, list of uncertainties that will affect the future in terms of costs and consumer acceptance, etc. And you need to have the relative magnitude of those effects and those bullet effects that, you know, if the state legislature decides to take this action, it will increase the probability by ten percent. But the range of cost uncertainties are 50 to 60 percent of the effect.

I think that you need to be really clear about that, and that will also help you develop your Task 4 policy options, because the recommendations will fall out of those bullets.

You'll look at those recommendations and say, okay, boom, boom, boom, this is the way things will rain, from top to bottom, based on the analyses we did in Task 3 and Task 1.

And I think that that really is -- that's really the key point that you need to focus on in your final product that you're presenting to the legislature. And thank you.

PRESIDING COMMISSIONER BOYD: Thank you, Richard.

SPEAKER BROOKS: Hi, I'm Alec Brooks with AC Propulsion. I want to compliment the staff on putting together this analysis. It's a very difficult task. I have some specific suggestions and maybe some other considerations that ought to be kept in mind as principally relating to battery-electric vehicles and fuel-cell-electric vehicles.

First of all, the basis for comparison of energy efficiency may not be an apples-to-apples comparison, and there's data on one, but not data on the other. For example, the battery-electric vehicle is assumed to run two miles per kilowatt hour or 500 watt hours per mile. This is 66 percent higher than the only EV on the market

today, which is the Toyota Rav4 EV, which has a combined rating of 300 watt hours a mile. So right away there, we're counting EVs at 66 percent higher than today's technology, and I would expect further improvements from there.

In the fuel cell arena, there's discussion of a DOE research goal of energy efficiency at 25 percent load of a fuel cell, but this doesn't necessarily relate to how much better a fuel cell vehicle will be than a comparable gasoline vehicle. So the first suggestion I would make is don't use multipliers for how much better a fuel-cell vehicle will be than a conventional vehicle, because the conventional vehicle is a moving target. So use objective measures such as miles per kilogram of hydrogen consumed, rather than a multiplier.

The multipliers that were listed in the report of 1.83 to 3, I don't know of any data or suggested goals that show that those are realistic numbers. The Ford Focus fuel-cell vehicle that was just announced within the last week as their sort of production version claims a range of 160 to 200 miles on four kilograms of hydrogen, which is about a gallon of gasoline per kilogram. So

we're seeing we're getting sort of 40 to 50 miles per gallon equivalent on gasoline, which, depending on your baseline, I would call that 20 percent to better to no better, if you compare it to something like a Prius or a Honda Civic hybrid.

Another area that I think needs to be considered in looking at fuel-cell vehicles and how they would be deployed is how the hydrogen is created. I know your analysis is looking at natural gas reforming, but we also see there is a significant effort looking into using electrolysis to make hydrogen. And the energy efficiency of that pathway needs to be evaluated and compared with the other choices that we're making here.

For example, it takes 55 kilowatt hours of electricity per kilogram of hydrogen produced in your tank and in your car. So at today's electricity prices, that's not subsidized or low rates, that's over $50 a fill-up for that Ford Focus. So it's not a very good deal yet.

Another thing, getting back to the fuel, comparing fuel efficiency of today's cars to the future, today's cars are going to be moving targets so I think we're going to see a very large penetration of hybrid-type technologies, whether

they be start-stop systems or Prius-type systems or Honda-type systems. I think by 20 years from now, all of the internal-combustion-engine cars that are left will have something like that in them already.

And then in the cost arena, I was very surprised to see the incremental costs of battery electric vehicles being higher than fuel-cell electric vehicles in a mature market. It doesn't seem quite believable, and when you trace back, and the data that was quoted for this was the battery technology advisory panel report, that report I think incorrectly assumed that a battery electric vehicle would consume 330 watt hours per mile DC, which is already higher than the AC rating of the Rav4. A better number for DC is on the order of 160 to 200 watt hours a mile.

And when you change that assumption back to something that's more readily or what we've already achieved in UV's, you come to the conclusion that you can use lead acid batteries and not advance batteries, which dramatically changes the cost picture.

The other thing that the battery technology panel didn't have available at the time

was the example of the Toyota Prius. That's been on the market now for about a year and a half, and now Toyota is saying that that is a profitable vehicle for Toyota, it's contributing to their corporate profits. So for just over $20,000, you get this hybrid vehicle with almost a full electric drive train and a fancy battery and a very good gasoline engine.

The battery pack in Prius is about the same cost as a lead acid EV pack would be in the same volume. So you could make a Prius-like battery EV and delete the cost of the gasoline engine and all of its systems and have a battery electric vehicle probably at just maybe one or two thousand dollars at the most over the cost of a small four-door sedan. So it's certainly less than the price of the Prius and given the same volume production.

I have several other comments, but I'll sit down and let other people talk. I'd be happy to talk with the staff later.

PRESIDING COMMISSIONER BOYD: Thank you.

SPEAKER MORALES: Good morning. I'm Ric Morales with the Department of Transportation, Mass Transportation Division.

I was just curious about the option four items, and I notice that you didn't include ride-sharing as an option. And I was wondering why.

CEC STAFF FONG: Well, my response to that is that I think historically we've looked at how that particular option might reduce VMT, and it appeared to us, at least, that there are many other sort of behavioral options that would result in larger VMT reductions. So we chose not to include it at this time.

Plus there seems to be a trend away from ride-sharing that, like in the South Coast Air Quality Management District area, ride-sharing is no longer I think sort of a major policy-driven option. So at least for the analysis that we did today, we chose not to really re-explore that particular option.

SPEAKER MORALES: Okay, thank you.

CEC CHAIRMAN KEESE: Sir, let me ask you a question. Do you see an increase in ride-sharing on the horizon?

SPEAKER MORALES: It's one of our goals, increasing vehicle occupancy. So yes, we'd have to think we're going to have to increase ride-sharing.

CEC CHAIRMAN KEESE: And do you see the State of California adopting that as a policy? You know, I'm very familiar with ride-sharing and multiple-occupancy lanes, but they just don't seem to have had the impact one would have hoped for. And the question is are you suggesting that it will be a high enough priority to the State of California or the Department that it is something we should put on agenda, because it will -- we're going to get there.

SPEAKER MORALES: Yes. It is one of the goals that the Department has recently established. In fact, we're still working on it, working on what our measurements would be.

But it is a goal of the Department to increase vehicle occupancy, to increase efficiency of the lanes. The Department has not been involved in transportation demand management in recent years, but we are exploring what our role might be. And so yeah, it is a priority for the Department and it is something that we plan to be more actively involved in.

CEC CHAIRMAN KEESE: I think it would be, we should continue the dialogue, so that we can tie it in with our efforts too.

SPEAKER MORALES: Okay.

PRESIDING COMMISSIONER BOYD: I agree with Chairman Keese. If the Department of Transportation has made this as a policy goal, we should support them in that effort. And I would hope the staff would look into this.

I can appreciate Dan's answer, as I'm sure there are some battered and bruised public officials sitting up here, battered and bruised relative to the topic of ride-sharing and the role it used to play certainly in the air quality arena. And other policymakers above and beyond us have spoken, let's just say, on the subject. So it doesn't have the priority it used to have, and maybe it deserves more priority.

And if the Department of Transportation has put it back to the front and we can line up behind them, why, we should probably do that and at least have the staff look into this.

SPEAKER MORALES: Yeah, I definitely would say it's premature to pronounce it dead.

ARB CHAIRMAN LLOYD: Well, you've got some big trucks to line up behind, so --

SPEAKER MORALES: Okay, all right.

CEC STAFF FONG: It would be helpful,

though, that if you do have data that can help us judge or evaluate the displacement potential, the timing and what-not, that that would be very valuable to us.

SPEAKER SCHWABE: Good morning. Thank you for the opportunity to speak in front of you. I have --

CEC STAFF FONG: Would you state your name, please.

SPEAKER SCHWABE: Oh, I'm sorry, yes. My name is Michael Schwabe. I live in Union City, and I and Jerry Pohorsky, we drove up from Union City, which is a little over 100 miles, in one charge in my EV1.

I am very much for EVs, but I'm sure you've heard all of the good things about EVs, so I'd like to just kind of mention a couple of personal things to illustrate that these cars are very, very viable as a fairly long-distance vehicle.

I've been a delighted driver of my EV1 for almost four years now. It's my only vehicle, and it meets 99.9% of my driving needs. If I do need to go out and go on a long trip, I will go rent a vehicle. I have even been to Los Angeles

with my vehicle. It's a nice, leisurely, long trip, but it was fun. I enjoyed it and I'll probably do it again.

I'll be the first to admit that EVs are not for everybody, especially in a single-vehicle household, so I would like to very strongly urge that rechargeable hybrids get a large focus, and that auto manufacturers be urged to develop these type vehicles. Not being able to charge from a grid I think is a very great drawback, and if the manufacturers could create a vehicle that would get between 40 and 80 miles on a pure EV range, I think that would be a very, very good vehicle and would go far in reducing the fuel dependency that we have right now.

I was appalled and very disappointed with GM's decision to pull the EV1s off the road and crush them at the end of the leases. I still have a faint hope that that may change. I don't know what pressure can be put on GM to do this, but I am hoping that we will be able to re-lease these cars. This is the only car, the only electric vehicle that would make the trip from where I live up to Sacramento in one -- without charging.

These cars, if they keep them, would also be an excellent test vehicle to -- test beds for a grid-rechargeable version of the EV1. It has a charge port already, I'm sure a small tank could be installed in it, and a new propulsion system that does have a very small gas engine.

And one of the things I forgot to mention, I drive between 1,000 and 1,500 miles a month. As I said, it's my only car. It's also my business car, and I drive all over the Bay Area with it. Thank you very much.

CEC STAFF FONG: Thank you.

ARB CHAIRMAN LLOYD: By the way, it's wonderful to hear talk so eloquently about the benefits of EVs. Again, it's great to hear that coming forward and seeing that, in fact, they do have a future here. I think it also brings home pride to Jim here, who was the executive officer of the ARB when, in fact, that regulation was put into place.

PRESIDING COMMISSIONER BOYD: Thank you, Alan, thank you for that compliment, and I love EVs, Michael.

SPEAKER NEANDROSS: Good morning. I'm Erik Neandross with Gladstein and Associates and

the Interstate Clean Transportation Corridor. My comments today will be focused primarily on heavy-duty and natural gas; more specifically, LNG.

I want to compliment Dan and the staff on their report. We're pretty pleased with the way that it's shaping up in that it's showing natural gas in heavy-duty applications will be a cost-effective option for the state in the future. I think some of the numbers are a little overestimated, some are underestimated, and we can work with staff to get a greater accuracy there.

I think overall the one disagreement that we have is we think the technologies are more of an intermediate technology than a long-term technology, like they've been identified. We're seeing pretty significant penetration in California right now, in transit and refuse applications, and even private over-the-road class seven and eight trucking applications.

We've got a great infrastructure base being built up in California. We have about 20 or so LNG stations now operating. We've got another 30 under development, about half of which are in the construction phase right now. We've got 13 certified heavy-duty engine products by the ARB.

We've got increasing acceptance among the fleet operators, some of California's largest companies: Waste Management, BFI, Sysco Food Services, Von's, Raley's, Harris Ranch, UPS, cities like the City of LA, San Diego, Sacramento, and Long Beach. And most all of the major transit agencies in the state. When you add all of this up, you can see that the growth curves for natural gas in heavy-duty is an exponential curve, and we hope that that will continue.

One of the points that we want to make today is, I think everyone would agree this has primarily been driven by air quality, drivers. And we see AB 2076 as a real opportunity for the state to shift focus and continue to drive the market, based on what has traditionally played sort of second seat in the alternative fuel world, and that's petroleum displacement. So we would hope that staff's recommendations as to cost-effective strategies on the displacement for heavy-duty and diesel gets turned into good policy to continue to drive this market.

And we want to stress that the need is immediate, given the new emission standards in October of '02 on diesel-side programs like the

Carl Moyer program, are going to be more and more difficult to make the argument for these technologies. So we would hope to work with staff and we have some specific recommendations as to how to do that.

Just real quickly, one of them is to develop a Carl Moyer-like program that not only incentivizes emission reductions but also petroleum displacement, sort of a dollar-per-ton-per-gallon-displaced formula.

And then we recommend that the Commission look at programs to incentivize the production of unconventional in-state sources of natural gas, landfill gas, stranded wells, flare gas, sources that by liquefying them will provide a primary benefit of reducing greenhouse gas emissions, and then a good secondary benefit when that's used to displace a gallon of diesel in a truck, bus, a trash truck, and so on.

I guess in summary, we look forward to continuing to work with the staff to address some of these strategies and thanks for the opportunity to provide comments.

PRESIDING COMMISSIONER BOYD: Let me ask you a question. You indicated in major

metropolitan areas that you're having success and in the long haul you're having success. I didn't get the cumulative, but it sounded to me like you're talking about a hundred facilities, when you added what's in operation, under construction, and planned; is that right?

SPEAKER NEANDROSS: Right now, in the State of California we have -- I don't know the exact number, but somewhere between a thousand and 2,000 heavy-duty vehicles, class seven and eight, using LNG or CNG, primarily LNG. We have 20 to 25 LNG fueling stations throughout the state, currently existing up and running, dispensing fuel.

We have 30 or so LNG fueling stations under development, and that's not maybe I think I'll build it, it has funding secured, it has plans in place, is actually moving dirt right now, pretty solid plans to construct. And we expect that those numbers will continue to grow.

One of the other points I wanted to make, to support this growing demand we have now eight new projects to develop new sources of LNG in the State of California to meet the growing demand. So as the demand increases, so does the

supply.

PRESIDING COMMISSIONER BOYD: I guess my question is, if our two basic thrusts are long-haul and major urban areas, are we close to fulfilling the need for the number of facilities, fueling facilities? Or are we -- should we be heading for 500 as a target?

SPEAKER NEANDROSS: That would be good.

(Laughter.)

SPEAKER NEANDROSS: I think we're now at the point where we're beginning to see acceptance on some of the long-haul fleets, which has always been the real tough nut to crack, the ones that don't return to base at the end of the day. We're beginning to see them use these technologies, based on the infrastructure that we have available now, which is for sure limited, but available throughout the state.

I don't know if I could give a real good number of how many. When you talk about long-haul --

PRESIDING COMMISSIONER BOYD: I'm talking about baseline here, and you need a certain base to handle the long haul, and the corridor has been working on that.

And you certainly need a base to handle an urban environment. But if your only fleet is going to be Raley's out of West Sacramento, that's -- you only need one facility.

SPEAKER NEANDROSS: Right, right.

PRESIDING COMMISSIONER BOYD: So what does it take? Is LA sufficient? Does LA have sufficient sites to handle --

SPEAKER NEANDROSS: I wouldn't consider it sustainable; I think it's getting there.

PRESIDING COMMISSIONER BOYD: It's getting there.

SPEAKER NEANDROSS: And it needs to continue to be pushed, especially in light of the fact that the emissions drivers are now being reduced significantly. So yeah, there's work to be done, absolutely, if we want to continue to see this technology grow and not be left with really a couple hundred million dollars' worth of stranded investments --

PRESIDING COMMISSIONER BOYD: And what would you suggest is the growth factor? Are we growing at 20 percent a year, 30 percent a year?

SPEAKER NEANDROSS: We're seeing it, in LNG specifically, over the last five to ten years

we're seeing a doubling in fuel consumption of LNG every two years.

PRESIDING COMMISSIONER BOYD: Thank you.

SPEAKER NEANDROSS: Thank you.

CEC STAFF FONG: I'd like to point out again, and maybe you recognize this as well, that staff's current analysis on this particular option of using CNG or LNG in medium- and heavy-duty vehicles has two cost cases: one where we're assuming a mature market where the performance of these vehicles will improve and incremental costs will be reduced.

We also examined an intermediate-time-frame case where, based upon current costs and perhaps modest performance and cost reductions, we also project what the net dollar a gallon of diesel displaced might be. Our understanding, though, that in many of the successful market cases that occurred today, there still is substantial public support and without that public support the results may be much less positive.

And so we recognize that, as I said, that many of the group two options will require continued public support if they are to increase their current market impact. And we recognize

that the current success that has been achieved by many of these group two options is primarily driven from an air quality standpoint. But our analysis is sort of looking beyond that potential driver, and seeing what additional effort might have to be extended to improve the market share, if there is this overriding policy need to reduce our future petroleum fuels consumption.

SPEAKER NEANDROSS: I think that's one of the reasons why we're -- We understand that it has to make economic sense for these fleets to do this. They're in big businesses and if it doesn't meet the bottom line, it won't work. And that's one of the reasons we want to look at trying to lower the cost of the fuel, to make it cost-competitive with diesel where it becomes the likely choice of these fleets to go to something like LNG because they're going to save money doing it.

At that time, programs like the Carl Moyer program, direct government incentives to the purchase of the engines and the fueling infrastructure then changes to the buying power of the consumer. They'll drive that market if it makes economic sense for them to use that fuel.

They'll demand it out of their suppliers and dealers, so we want to explore that with you a little bit further.

ARB CHAIRMAN LLOYD: I'd like to thank you again for all your efforts and the company there to get natural gas and LNG out there. You're doing a great job.

A question to maybe Dan or Susan: When we look at natural gas supplies here, are we assuming any building of LNG terminals in California?

CEC STAFF FONG: No, on the supply side, we did not examine sort of the real cost or investment that might be required on the fuel supply. We did look, though, at what might be needed, in terms of a retail fuel price that would essentially make it attractive for fuel supplies to then produce and make the LNG available. So that, from our perspective, is the key driver.

What compensation is required, in terms of a revenue stream, for fuel suppliers to then make the necessary capital investment to make the fuel available? And so when we calculate what that retail fuel price is, that then allows us to calculate the effect on the consumer. But it

basically does incorporate factors that allows the fuel industry to make money doing this.

PRESIDING COMMISSIONER BOYD: Let me build on Alan's question a little bit. I was going to comment that I was glad, Erik, that at the end of your testimony -- you had earlier mentioned that air quality was the driver but towards the end you mentioned the economics, which is the ultimate key driver, is becoming fairly positive or is trending that way, at least in this area, which I think is a very positive thing.

And earlier in your testimony you made reference to something that's a little bit near and dear to my heart, and that is the use of stranded gas, off-spec gas, low BTU gas, etc. in California and its conversion to LNG, and I just wanted to comment a little bit on that, as well as to get to Alan's questions on LNG terminals.

About a year ago the governor asked Secretary Nichols' resources agency to form a gas working group to look at the natural gas issues relative to the energy needs of this state. And obviously, the electricity crisis and use of our domestic California gas supplies, and I guess I've, in effect, been vice chair of that group for

the past year.

And one of the areas that we're keenly interested in is the use of California domestic gas and the problems we have with some of our gas supply, and the fact that it can be easily, if facilities are built to convert it to LNG, thus avoiding a lot of the issues relative to blending either low BTU or other hot gases into the natural gas supply is quite fascinating to us. But again, we have a chicken-and-egg issue here, as you do in all of these alternative fuel situations of enough demand and so on and so forth.

But it is an issue we're pursuing and it does have an economic value with regard to the possible use for the expanding heavy-duty LNG business in California. And that gets to the subject of, therefore, there are other ways to get LNG supply, aside from just the idea of building LNG terminals in California. But I would point out that there has been and continues to be an interest on the part of many, many parties to indeed bring LNG to California.

And the economics of that question have shifted fairly substantially in recent history to the point that the market price of natural gas is

flirting in the range that would support the economic development of LNG terminals in California and the costs associated therewith. And the whole question of adequate natural gas supplies in California is one that we're keenly interested in, and LNG has some very positive attributes and economic possibilities.

And it's a question that undoubtedly the state will have to face. Once again, there's interest in building terminals here or across the border, close to California, etc., etc. And so I think its use, both as LNG or as the natural gas supply is likely to be seen in our working lifetime, Alan. So anyway, thanks for your interest there.

CEC STAFF BROWN: Commissioner Boyd, I just wanted to also mention that we commissioned the study of the potential LNG facilities, but our plans for California are actually either nine plants in the early planning stage, both LNG terminals, as you mentioned, south of the border along the coastline. They do, however, face some permitting challenges.

I also wanted to mention that the Commission's been very involved with the

demonstration of producing LNG from pipelining landfill gas. And the first of our projects with PG&E is intending to open the end of June, so some progress is being made there. The question still remains whether LNG could be price-competitive with diesel. And that's highly dependent on the border price of natural gas.

PRESIDING COMMISSIONER BOYD: Thank you for that addition.

SPEAKER KELLER: Good morning, members and staff. I'm John Keller with the California Highway Patrol, and I have four points that I'd like to make.

First, with regard to option 1(c), increasing the governmental fleet efficiency, certainly that's one of the factors that we think is important in the selection of our vehicles. But it's not the most important factor.

We would argue very strongly and have in the past that performance is critical to our enforcement vehicles, both in terms of the daily operations and the safety of the officer, if you're alongside the freeway and you need to pull off after doing a motor service or giving somebody a citation.

That leads me to the second option that's discussed in your report, the infamous 55 speed limit. We obviously have considerable local and national experience with that option. Certainly, the benefits are nebulous, as staff said, nebulous in a specific sense of what would actually come out of a 55 speed limit. Not to nebulous in that we very well understand the underlying issue there, and that is compliance. If motorists don't comply with the law, then that means they don't slow down, which means there are no fuel conservation benefits.

We have written a million tickets a year for violations of speed limits. We can do that again, but, you know, from 1974 through 1986, we certainly had graphic demonstration that motorists are generally unwilling to drive at those lower speeds. So certainly, any part of a strategy that advocates going back to putting up new signs along the side of the road, if we are serious about getting benefits, fuel-saving benefits from that strategy, there has to be a pretty significant public education -- I'll call it education, but attitude adjustment is really the critical part of that.

The last two points: Inherent in many of the strategies or the options that are being explored are lighter-weight vehicles, and there's credible research which shows that lighter-weight vehicles involve safety penalties, primarily which occur when vehicles of dissimilar size collide with each other. There has been some work on the impact of CAFE standards on vehicle safety, and I think the policy debate in the legislature could be illuminated by discussion of those kinds of issues in the report.

And then lastly, certainly the context of this report is one of our vulnerability in a global sense to petroleum dependence. We have a pretty uncertain but much more local security concern, which could play out in a number of these options, in terms of assessing our vulnerability to terrorist threats.

I don't have specific comments on any one of the options, but certainly that's a relatively new factor that we would have to consider as we look particularly over the long term that the report covers. Thank you very much.

CEC STAFF FONG: I think the staff did consider at least your first point, that many

local and state fleets purchase a large number of emergency services and law enforcement vehicles, and that in our evaluation in trying to determine the potential fuel displacement that comes from that potential policy shift, we I believe did not include or tried to estimate the number of emergency services and law enforcement vehicles that would potentially be impacted, and then excluded those vehicles from our fuel displacement calculations.

So that we would not necessarily subject those types of vehicles to some fuel efficiency policy that would reduce the utility of those emergency services vehicles.

SPEAKER KELLER: That would be great. The report was not as specific as that. Thank you.

PRESIDING COMMISSIONER BOYD: Thank you.

SPEAKER OVSHINSKY: Ben Ovshinsky, West Coast representative, Energy Conversion Devices, and speaking personally with some remarks about the plug-in hybrid, which I'm a very passionate and complete supporter of.

One, I see the plug-in hybrid as a 100-percent primary vehicle, all-in-one vehicle that

basically could replace any of the nearly 16 million ICE light-duty vehicles sold in the United States every year, just as an ICE, just replace it.

And that in its operation -- So there are no considerations about pure electric BEV, battery electric vehicle being -- you'd have to be a two-car family or a three-car family or a niche market, this is a primary vehicle per se, that in its worst case would operate as a Prius does now, with all of its attendant fuel economy, emissions, greenhouse gas benefits. But that -- And that would be between two and three times the fuel economy of a comparable ICE.

But in its best case could deliver anywhere from -- And I haven't had a chance to really read the 245-page report -- Susan, I'm hoping I can get a hard copy, it's hard to read on my computer screen -- but I gather anywhere from between 63 percent from the Energy Commission to 80 to 90 percent of its VMT, where the rubber hits the road, would be pure ZEV mileage. And with the key factor being up to potentially 100-percent market penetration, potentially 100-percent market penetration because it's an all-in-one primary

vehicle, like any ICE.

And yet, you could get with that a nearly -- anywhere between 60 to 90 percent ZEV-mandate car, effective ZEV-mandate vehicle, all without any alternative fuels or fuel infrastructure -- CNG, ONG, etc. -- just operates on gasoline and electricity, but much less gasoline and much more stabilized electricity, helping to level the load.

I think my last point, costwise, which is much more debatable and much more fuzzy out there, but inherently has -- a plug-in hybrid would have approximately probably about one-third the battery pack, size, cost, weight, volume of a pure EV that would do even more -- Well, actually -- Yeah, let's leave it at that, about one-third, and about one-third to one-fourth the ICE engine.

And my remarks are predicated on the vehicles that I've seen and am very, very impressed with. They were developed out of UC Davis by Professor Andy Frank and his incredible crew of undergraduate and graduate students, which have attracted the attention of DARPA and the Department of Education and even General Motors,

and would also have a much simpler transmission.

So in summary, I guess I'd just come back, if I had to capsulize it, to me, it's an all-in-one 100-percent primary vehicle, and I just can't see that being denied. And when you look at it that way, it's so compelling. Thank you.

PRESIDING COMMISSIONER BOYD: Thank you, Ben.

SPEAKER FREEL: Thank you. My name is John Freel. I work for Chevron Texaco. Chevron Texaco does not have any prepared remarks at this point, so I probably shouldn't be standing here, but at my age, what more can they do to me?

(Laughter.)

SPEAKER FREEL: I believe we will have much to say when the rubber really hits the road on this very, very important study. And we think the rubber will hit the road when you begin to shape the quantitative goals that you believe the state should have for reducing its dependence on petroleum, and the policies that you believe the governor and the legislature ought to take up in trying to accomplish those objectives.

What I would like to say today, and it is truly on my own behalf, is as Chairman Lloyd

said, looking 30 to 50 years out is an extremely opaque window to look through. And I'd like you all to think about that, staff all to think about that as you begin to arrive at what you believe the state's targets and policy options ought to be.

I would like to contrast what we're doing, in looking 30 to 50 years down the road, with how far we're looking back. After all, it's easier to look back, we have data. But this morning I heard if we look back two months we see the price of gasoline go up again, which clearly adds impetus to what we're doing today. We've heard about the importance of September 11th as providing a very strong driving force for what we're doing today.

In the SFR study we went all the way back to 1999, when three refinery problems occurring almost simultaneously in California led to extreme price volatility, which really was the activity that led to AB 2076. I would argue that in arriving at goals and policy recommendations, we ought to look back at least as far as we look ahead.

And unfortunately, I can remember 1972,

30 years ago, quite vividly. I wish it were otherwise. But I wonder if you've thought about what the world of 1972 looked like as you try to envisage what the world of 2032 may look like. Do you remember that in 1972 many of the world's climate scientists believed that we had an ice age coming in? That many parts of North America would enjoy continuous snowfall year-round? That many of the important shipping lanes in the ocean would no longer be open for navigation year-round?

Do you remember that we were in the middle of a cold war? Do you remember that we were entering a period or were in a period when the American economy simply couldn't compete with those of Japan and West Germany, and when many in government argued that they had the answers to make us competitive? But you know what made us competitive again, and truly it was not government.

From the point of view of something that is more pertinent to what we're doing today, it wasn't in 1972 but just over the horizon, OPEC tripled the price of crude oil overnight. The response of the Carter administration was to declare that we were running out of crude oil,

that the United States clearly had to become energy independent. Some of you are old enough to remember what happened during the Carter administration. All of the government intervention with all of the bells and whistles, and what happened? It made prices worse, it made gas lines at stations that didn't have gas. In some cases it almost led to civil insurrection at the pump.

Now, I don't believe that what we're talking about today -- I'm exaggerating to make a point, let me make that very clear. But even though I'm not speaking for my employer, I have a very strong faith in the power of the free market. I think government must intervene if that market is broken and must try to fix it. But we need to be darned sure that it is broken.

Fast forward from 1972 to a time much closer when we thought electricity pricing was broken. The legislature was convinced that there was a huge problem, and they restructured the industry and made sure that their vision came true, didn't they? I would urge you not to do the same thing to the current supply of fuels in the State of California. Thank you.

PRESIDING COMMISSIONER BOYD: Thank you for your comments.

ARB CHAIRMAN LLOYD: I just want to make one comment there, that again, your faith in the private sector, I share that. Because I also feel that what we're looking at here is reducing dependence on petroleum, and that no matter what that energy is going to be, that the energy companies, if they're like the old oil companies, are going to play a key role in all of that. And we've seen evidence of that happening with your company in other areas of technology.

So, again, I think what we have learned is when we're not talking about a threat that maybe you implied, I know on a personal level, to the oil industry, this is an opportunity for the energy industry.

SPEAKER FREEL: May I?

PRESIDING COMMISSIONER BOYD: Please, this is a --

SPEAKER FREEL: Chairman Lloyd, I agree with everything you said. As you know, we and most of the other major oils are not against change. We believe we are providers of energy, not necessarily gasoline and diesel fuel.

My comments really were somewhat exaggerated, but just to agree with all of you sitting up there, that this is an enormously important endeavor that you're part of, and whatever recommendations you make I know will be fully considered, but they are going to be very, very important to the state for a long time to come.

PRESIDING COMMISSIONER BOYD: Thank you, John. I really do appreciate our comments, and I didn't hear you say anything that's going to get you in trouble with your employer, so --

UNIDENTIFIED SPEAKER: You never know.

(Laughter.)

PRESIDING COMMISSIONER BOYD: True, speaking at all sometimes can prove to be dangerous, I've found that to be true.

Let me just also indicate that yes, some of us are old enough to have memory of all the events that have taken place in the past, and let me assure you that I for one and I'm sure anyone experienced as everybody up here is in government indeed looks at the lessons of history and looks back at history and, if you've been around long enough, you see yourself going around in the same

circle multiple times. So that's a valuable point.

Something you said reminds me of comments that have been made in some of the other workshops, and that is, a), how important the evaluations that are taking place now are; b), how comprehensive they are, and some folks have even commented that it's kind of a broader view than anyone has done, perhaps, certainly in California. And it's a view that perhaps the industry, for legal reasons, is hard-pressed to do collectively.

And so there are roles for government, positive and negative, and maybe perhaps here is a government role that is proving to be a positive. The ability to legally take a big broad look at this whole question and have a lot of input is extremely important that we get into it from the effect to the industry. And Chairman Lloyd couldn't have been more correct in commenting on the recognition by some and the need for all to come to the point that the future is dependent upon the energy companies of the future, not just the oil companies of the future.

And I think that's a very relevant point here, so yes, we have learned from the lessons of

history, and yes, we need to take those into account. And I'm painfully reminiscent of the Carter days, so we don't want to get in that mode. By the same token, you know, we do have, a), a responsibility to try to do the best we can; and b), recognition of the increasing population growth, the increasing depletion of some of the scarce resources, and the increasing demands for everything. So that just marches on time immemorial, and we do have to deal with that.

So, again, I really appreciate your comments and I look forward to your industry helping us with answers to a lot of these questions, and that's why we've, as I've said, provided more time for everybody to be a player here, so thank you.

CEC CHAIRMAN KEESE: Okay, thank you.

I don't know what your schedule is, Mr. Chairman, but I appreciate the comments. I look forward to the detailed comments also, because I guess I was getting ready to go to lunch here, thinking that the oil and auto industry had decided we'd done a perfect in scoping the scenarios because we haven't heard a word yet.

We obviously have been given a challenge

by the legislature. We were given a challenge when they passed 2076 and we were given a further challenge when they said it's of vital significance that you do a thorough job; please do it. We recognize it, that we don't have all the world's intelligence up here or in our commissions. We need the input from the oil and from the auto industry, and from everybody that we've heard from so far.

We have to put this together, and we're supposed to come up with options. The legislature wants to know what options do we have. And then, as we heard the Highway Patrol suggest, we can tell them what 55 will do. I'm not going to tell them they should take the speed limit down to 55; I can't afford it.

But we'll put the options out there. And so we need your help in helping us come up with the options. Thank you.

SPEAKER KOEHLER: My name is Neil Koehler with Energy Resources. My company is trying to build an in-state ethanol production industry to do our part to provide some petroleum displacement.

Continued compliments to staff on a very

good work in progress. It's really taken on some incredibly large issues, with a lot of both quantitative and qualitative analysis involved, and I think staff is just doing a great job, trying to incorporate all of that as we move forward.

Just a couple of comments on the ethanol scenarios, both the E85 and the E10. On the E85, you know, I think we're seeing in both these scenarios that ethanol can't have a very significant role in displacing petroleum as an alternative renewable fuel.

In the 85, a couple of issues just to work on, fine tune. The analysis assumes what looks like an approximately 25-percent mileage penalty on E85, and while that's true based upon the energy density differences of the two, the analysis also assumes that we're running most of these FFEs. In fact, the assumptions were that they were running almost exclusively on E85.

And one thing that we've been certainly conversing with the oil companies and through ethanol vehicle challenges, it's been technically shown that if you, rather than optimize the FFEs for gasoline, which is really the case today

because that's what they're running on, and instead optimize the FFEs for ethanol, with gasoline being the fuel that you run when you can't find the ethanol, that that allows you to increase compression ratios, improve the efficiency so that you take advantage of the inherent efficiency of the ethanol and its ability to combust more completely, which is, you know, both helps improve mileage and air quality.

And that the ethanol vehicle challenge has, for a number of years standing now, has amply shown that you can get equivalent gas mileage, even with the 25-percent, 30-percent-less BTUs per gallon, that you can make adjustments in those vehicles to achieve and in some cases they have surpassed the mileage performance of those cars running on gasoline.

So I realize that presents some challenges to the auto industry, in terms of how then those cars will be running on gasoline, but maybe there is some happier medium from where we fully optimized ethanol to where I think we are today, which is really fully optimized for gasoline, and not taking advantage of the advantages of ethanol. So just something to look

at, because I think it certainly was a large part of the cost disadvantage if not the exclusive component of it, or the largest part of it, and I think that can be addressed.

The other thing on the economics, and I may be wrong and so this is more a question, but it doesn't appear to me that the economic assumptions in the E85 scenario is incorporated in the uses of blenders tax credit. So the ethanol cost numbers I saw in there seem to be wholesale cost numbers on ethanol before the blenders tax credit. So when somebody sells ethanol to a gas station that then is going to sell and produce the 85, they can take an income tax credit, a 53-cents-per-gallon tax credit. It's actually a taxable tax credit, so it gets reduced and it's not quite as powerful as the excise tax exemption for ten-percent ethanol blends.

And, you know, clearly that would reduce the cost and in today's ethanol world, and it's really been historically true over the last number of years, that ethanol, net its tax incentives, both in blends and in E85 applications, is cheaper than gasoline. So I just want to make sure that we're fully incorporating the use of the blenders

tax credit and E85, and I think that will change the economic assumptions currently in the draft.

On the E10, happy to see that that scenario was added. I have a question still, and I have not read the base case analysis. I know it was not clear from the original analysis what the assumption was on how much ethanol was in the base case. I think we were talking about assuming that a 5.7-percent ethanol blend was in the base case, so the only incremental change would be between five, seven and ten.

And while that's fine to assume, I think, you know, given the continuing resistance on the part of the State of California to see ethanol used in all of its gasoline, that really, a more realistic base case is probably something less than 100-percent market share of ethanol in the gasoline, which means that if we're looking at either a five, seven, or a ten-percent ethanol blend, that petroleum displacement is greater than just that increment between five, seven, and ten.

Because I think it's realistic given both the federal efforts to give California flexibility under renewable standard and, you know, comments by state officials in California

that natural ethanol demand in California is more on the order of 275 million gallons, somewhere, 250, that really, a base case maybe should not assume that 5.7-percent ethanol is in all of the gasoline. So just something to talk about, dialogue about, and come up with what the realistic base case would be, and then, obviously, anything above that is petroleum displacement.

Lastly, just drawing attention specifically, Chairman Lloyd, to you on the issue of the predicted model and it's come up repeatedly in these workshops on the MTB phaseout, even since the alliance auto data was released, that it is showing, particularly in the advanced vehicles, the newer technologies, that we're seeing some pretty different responses on NOX, CO, hydrocarbons, all very favorable towards the use of ethanol blends. That study was done to really have a real-world test of phase three specifications, with the intent that when the study was done, we'd look and see what modifications to the predicted model should be undertaken.

And I think it's pretty clear that that data does indicate that it's something that we

should look at. It was certainly part of the Energy Commission's final Stillwater report. It was a recommendation that the predicted model be evaluated. It's referenced in this report; in fact, it's assumed in the modeling that the predicted model is adjusted. Because right now, ten-percent ethanol blends are next to impossible to do in California, given the predicted model.

And plenty of other stakeholders, other state agencies, numerous environmental groups have all testified at these various workshops on the need to really reopen the predicted model so that we get fair value for the use of the ethanol and gasoline. That obviously makes sure that we optimize the air quality advantages of the use of ethanol, but obviously from a petroleum dependence and energy supply standpoint, that the more ethanol that we have the option to use in gasoline, the better off we are and the more options that we have.

So just to encourage you, particularly in this time that -- you know, the governor extending the MTB phaseout, it appears that we have more time to really take into consideration some of these issues. And I would just encourage

you to work with all of the stakeholders and convene a process as soon as possible to really evaluate what changes are appropriate in the predicted model. Thank you.

ARB CHAIRMAN LLOYD: Neil, I will certainly ask staff about that and get back to you.

SPEAKER KOEHLER: Great.

ARB CHAIRMAN LLOYD: The other part I was going to ask, in referenced was an earlier statement there, yes, there are a number of flex fuel vehicles in the state at the moment, but obviously running on gasoline.

Do you have enough ethanol in the state to convert all of those so they could run on E85?

SPEAKER KOEHLER: If there was a way to distribute the fuel, yes. I mean, there is enough ethanol that's -- I mean, I don't know what the demand would be for the vehicles right now, I don't have a number off the top of my head. I know that we're producing about eight, nine million gallons in California today, but obviously there is a lot more used in California.

You know, we're on the verge, if we can develop the right level of state support, there

are six or seven ethanol production projects that are ready to be financed if we can begin putting together the right support for them. So I would say there is no question that we have the ability to supply those FFEs, and it's really more a problem of, you know, how do we distribute it.

We are personally working with, through some Energy Commission programs, with some of the government fleets so that they can install tanks, and I think you'll see that in the next number of months, that we will have some ethanol used in those fleets where they have control over their distribution. But it becomes, you know, on a wholesale basis, that really becomes an issue of how do we -- no different than the problems we have with E85, how do we get E85 distributed through the conventional and commercial distribution system.

ARB CHAIRMAN LLOYD: Yeah. I guess you were saying, you drew the distinction between currently available and then lots of plants in financing stage, so --

SPEAKER KOEHLER: Right.

ARB CHAIRMAN LLOYD: -- maybe staff can give some idea of, you know, sometime just -- I'd

be interested in seeing how much is there today and whether -- if we could distribute it, which is obviously a big if.

SPEAKER KOEHLER: Right.

ARB CHAIRMAN LLOYD: If you could get the right place, the right time, if there's adequate supply there.

CEC CHAIRMAN KEESE: May I ask, eight or nine million gallons a year?

SPEAKER KOEHLER: Yeah, there are two small ethanol plants today in California.

CEC CHAIRMAN KEESE: And does most of that go to the major oil companies for blending, or where does it go?

SPEAKER KOEHLER: Well, currently that would be the market. There is one company, Phillips, formerly Tosco, who has moved out of MTB into ethanol, and the fuel ethanol is currently sold to those --

CEC CHAIRMAN KEESE: So the California production goes mostly to fuel?

SPEAKER KOEHLER: That's correct, because that's the current market.

CEC CHAIRMAN KEESE: Thank you.

CEC STAFF FONG: And one comment. I

think, you know, when the staff set out to define the sort of conditions that we would model, we first said, okay, we would assume all state and federal laws would be satisfied, and I think for the ethanol cases in our base case, at least, we assumed that if federal law required the use of an oxygenate, we would then use the assumption that our gasoline would contain the oxygenate.

CEC CHAIRMAN KEESE: I certainly remember. It was not only staff, but the committee who struggled with that --

CEC STAFF FONG: And as far as I know, that still is the law, so --

CEC CHAIRMAN KEESE: -- and it's very difficult to come up with a base case that doesn't comply with current law, which has been suggested won't be changed.

If there is a change, then we'll certainly get around to dealing with that, but I don't know --

CEC STAFF FONG: But I think the staff also understood, from our discussions with the oil industry, though, that in the absence of a requirement for an oxygenate component, many refineries would still use ethanol as a biometric

and octane ingredient. And, in fact, the volumes that would be used in that case, where an oxygenate would not be required, was still quite large.

So to assume that there would be no ethanol used in the absence of a requirement is probably also not realistic.

CEC CHAIRMAN KEESE: I think the committee agreed with you, in the past.

PRESIDING COMMISSIONER BOYD: Before you speak, let me just respond to the -- Chairman Keese's question about lunch a little while ago. We'll go until we finish those who want to speak to this particular topic. I think we're getting near the end, based on -- In fact, let me ask for a show of hands. How many other people in the audience want to speak to this topic?

ARB CHAIRMAN LLOYD: But did you see the size of the binder?

(Laughter.)

PRESIDING COMMISSIONER BOYD: All right, there are still two or three hands in the audience. Perhaps we can make it till 12:30. I don't want to discourage anyone from speaking, because those of you who haven't been in some of

the other workshops know there was a paucity -- I mean, I think this is wonderful we're having many people speak to the issue today.

So I'm prepared to go as long as it takes to go, but when I said that a few weeks ago in San Jose, the audience took me till 1:45 in the morning, so I don't want to have that happen again.

(Laughter.)

PRESIDING COMMISSIONER BOYD: Anyway, proceed.

SPEAKER FEARN: Thank you.

PRESIDING COMMISSIONER BOYD: Excuse me, I'll just say, by going a little later we're going to avoid the huge lunch crowds, so you'll have a shot at finding something.

SPEAKER FEARN: Thank you for the opportunity to speak. My name is Samantha Fearn, and I'm here representing Honeywell. One of our wholly-owned subsidiaries of Honeywell is Garrett, which is based out of Torrance, California, and produces -- it's an engine-boosting technology, turbochargers, superchargers.

I'd like to just, again, reiterate comments from previous speakers, commending staff

on the magnitude -- I didn't mean to make this a visual display, but I think it is a visual display of the magnitude of the work. And this is just Task 3, so -- that the staff has undertaken in working on this.

I did have a couple of questions for staff, and specifically to the technology options utilized in option 1(a) on improved vehicle fuel efficiency, and specifically to the ACEEE or E cubed moderate advanced technologies, whether or not either of those had any kind of supercharging engine technology in their general package of technologies.

And then additionally, the NRC Path 3 shows engine supercharging or turbocharging and downsizing the engine as a fuel efficiency measure, which is certainly something that we would advocate for. And the EEA model lists, at least in this chart, which I haven't been able to get a copy of the EEA model, but the EEA model lists supercharging but it doesn't mention engine downsizing in conjunction with that. So that would be a question as to, you know, where those -- what the detail is on that chart that I would like to find out.

And then also, there was a comment in the first section relating to how this particular, the option 1(a), excuse me, on fuel efficiency does not really address driveability and performance issues, or questions that may come up from a consumer standpoint, but rather the fuel efficiency issues that result from various options or technologies. And I think that headed into the policy arena, one of the things that folks are going to look at and that certainly our technology has demonstrated, at least in Europe, is that the driveability and performance -- and not to add another task, heaven forbid, but the driveability and performance issues will be huge in driving consumer activity.

If you have a four-cylinder engine that the driveability or the performance of it is not going to get you moving in the way that you want to move, you're not going to opt for that, even though it may or may not be the best fuel-efficient vehicle. One of the things that we've been able to illustrate is the fuel efficiency of a four-cylinder vehicle being the downsized engine, putting a turbocharger on that vehicle gives it the driveability, the performance, the

torque of maybe a six-cylinder vehicle, it increases that dramatically. And with that, as opposed to a naturally aspirated engine, allows the fuel to be used in a more economical, efficient fashion, and increases performance dramatically for that four-cylinder engine.

The other issue, and that's certainly something that we would like to see addressed is the benefits, even if it's just in the same vein as tire inflation, the improvement in fuel efficiency, the benefits of engine downsizing, and the consumer aspect of the benefits of engine downsizing, when they want the performance, they're going to go a direction to get something that enhances that performance of the smaller engine, but to focus on the engine downsizing benefits that can be obtained for fuel efficiency standards.

Just to give you an example, a typical engine in typical driving conditions is only using about, in these large engines that many of us have under the hood, is only using about 25 percent of the engine's power capacity. And, frankly, it's driving at a very, very inefficiency state on a regular basis. The basic road load level of what

that engine drives on is very inefficient. A smaller engine with a turbocharger boosts that up and gives it a more efficient driving driveability and better performance as well.

The other issue, and again, I promised brevity, so I will wrap up here quickly, is on the light-duty diesel issue. I understand there is a steep incline to continue going, but I do hope that we will continue to climb that incline, and really consider looking at that. There are many technologies. While maybe existing technologies are not going to meet the standards that are down the road for the diesel vehicles, there are new technologies.

One of the technologies that we're developing is an electrically assisted turbocharger, which does eliminate additional emissions. We have submitted into the last docket, I believe, from following the previous meeting, some charts and information on the electrically assisted turbochargers with diesel engines as well as, and the emissions benefits that go along with that or that we're hoping will go along with that.

We're looking at about three to five

years down the road to market on that, but we think it holds a great deal of promise, and with the lower sulfur content diesel fuels that are coming in line from the federal government, we think that there still may be an opportunity for us to displace that amount.

Finally, I just wanted to make one comment on the light-duty diesel analysis, and it used the Jetta as a comparison or a comparative item for the difference between a gasoline Jetta and a diesel Jetta, and the same liter engine and all that type of thing. I guess my question would be is does that $900 price difference take into account the fuel economy benefits between the diesel- and the gasoline-powered engine?

CEC STAFF FONG: That particular incremental cost does not include any fuel impact.

SPEAKER FEARN: Okay.

CEC STAFF FONG: We were trying to estimate what the incremental cost would be between a gasoline vehicle and a diesel vehicle. So the Jetta example was used to first try to estimate what the change in engine might be.

We then made a separate estimate for what would the additional emission controls that

would have to be added on to that diesel vehicle that would then allow it to meet California emission standards.

So the $900 difference that we looked at for that Jetta thing sort of established an initial threshold for just changing from a gasoline engine to a diesel engine.

SPEAKER FEARN: Okay.

CEC STAFF FONG: And it was only meant to then sort of compare with the numbers that we reviewed out of a DOE report. So they looked fairly comparable. And so we assumed that the DOE analysis only looked at the change from gasoline to diesel engine, and, therefore, did not also include an emission control impact.

And so we had to separately consider the additional cost for the emission control package.

SPEAKER FEARN: Okay. Yeah, and I think that -- and again, moving towards the policy issue on the light-duty diesel vehicle, as a consumer, you know, looking at or educating consumers in a similar way that you would be proposing under the tire inflation or other cost-efficiency measures, to incentivize consumers in a way where they actually look at and calculate out that fuel

efficiency standard.

Looking at the chart, I looked at that Jetta comparison, and the DOE numbers show the Jetta on a gasoline engine as running premium, and premium -- I'm guessing, I'm from Arizona, I'm guessing -- $1.80, I'm assuming? Diesel may be $1.60, current. Current numbers would be, the $1.80 number would be $1,125 per year to run the gasoline vehicle on premium, as is recommended or as is listed in the DOE number. The diesel vehicle would be $533. So it's certainly an offsetting cost to an extent on the additional cost that might incentivize a consumer.

So thank you and I appreciate the opportunity and, again, would like to commend staff on their efforts and work on this.

CEC CHAIRMAN KEESE: Thank you. A quick question: You mentioned that you're having more success in Europe with the turbocharger?

SPEAKER FEARN: Yes. Yes, that's correct.

CEC CHAIRMAN KEESE: Is that on diesel mostly or is that on gasoline also?

SPEAKER FEARN: Diesel and gasoline.

CEC CHAIRMAN KEESE: And gasoline

vehicles?

SPEAKER FEARN: And gasoline vehicles, yes.

CEC CHAIRMAN KEESE: Is it increasing? Is the percentage use increasing over there?

SPEAKER FEARN: I know right at the moment it's about 50 to 60 percent diesel in Europe, not talking about the UK --

CEC CHAIRMAN KEESE: I'm sorry, 50 or 60 percent of the diesels are using turbochargers, or --

SPEAKER FEARN: Exactly.

CEC CHAIRMAN KEESE: Okay.

SPEAKER FEARN: Exactly, and -- Or no, 50 or 60 percent are diesels.

CEC CHAIRMAN KEESE: Are diesels.

SPEAKER FEARN: Right.

CEC CHAIRMAN KEESE: And how many of those are using --

SPEAKER FEARN: I don't know the exact number of the turbochargers, but of new vehicles, there are really frankly no new diesel vehicles that are made without a turbocharger, because of the problems in the lag --

CEC CHAIRMAN KEESE: And what percentage

in gasoline?

SPEAKER FEARN: I don't know the percentage in gasoline, I apologize. But gasoline with a turbocharger does increase fuel efficiency by about ten percent, with the downsized engine.

CEC CHAIRMAN KEESE: A few years ago, Ford did put out a little Mustang called the SVO Mustang, which is four-cylinder and turbocharged, which, as I recall at that time, the Highway Patrol used to catch Porsches. It was a rather effective little vehicle.

SPEAKER FEARN: Well, if you take a ride in one of those little Beetles that has the turbocharger with the four-cylinder, I would venture to guess it will have the same effect.

CEC CHAIRMAN KEESE: I recall.

SPEAKER FEARN: Thank you.

CEC CHAIRMAN KEESE: Thank you.

ARB CHAIRMAN LLOYD: Where do you make your turbochargers?

SPEAKER FEARN: We make some of them in Torrance. We have some operations in Mexico, and then also in South America.

ARB CHAIRMAN LLOYD: So if there were more opportunities in California, they would be

made here, create more jobs here?

SPEAKER FEARN: I'm not sure that I could dedicate the location of the manufacturing.

Thank you.

PRESIDING COMMISSIONER BOYD: Thank you. Excellent commercial for the products that Garrett sells.

(Laughter.)

PRESIDING COMMISSIONER BOYD: Did I infer from what you said that there is a correlation between the use of turbo and superchargers and any incremental increases in CAFE standards?

SPEAKER FEARN: I know that the CAFE report did utilize turbochargers with downsized engines as one of their technologies that they felt could bring certainly increased fuel efficiency standards and increased miles per gallon.

PRESIDING COMMISSIONER BOYD: And I think the auto industry recognizes that performance and driveability are very key selling points.

SPEAKER FEARN: Absolutely.

PRESIDING COMMISSIONER BOYD: If I'm not

mistaken, the new little Mercedes coupe has either a supercharged or turbocharged gasoline engine as well, so --

SPEAKER FEARN: With a small engine too.

PRESIDING COMMISSIONER BOYD: Right.

SPEAKER FEARN: As do the Audis and many of the others.

PRESIDING COMMISSIONER BOYD: So I think the drive for increased fuel efficiency will probably result in more business for Garrett, but you've got to get the farseeing function going here somewhere, and --

SPEAKER FEARN: We're just a small turbocharging company.

PRESIDING COMMISSIONER BOYD: Right.

(Laughter.)

SPEAKER FEARN: There's many others. Thank you.

PRESIDING COMMISSIONER BOYD: Who is next? One more, although I saw three more hands a while ago -- oh, there is still one more hand out there.

SPEAKER STRAND: Hi, my name is Muriel Strand, and I'm here as a private citizen and as a scientist. And I really haven't been following

this process that closely, but I did read the Task 3 report. And what I'm here to talk about really is broadening the discussion. In fact, you may even find my comments a bit radical.

In terms of the overall conceptual plan for this task, it appears to me that estimating future supplies of petroleum isn't included. Now, to me this seems like a fairly major oversight, since there is some corporate and scientific discussion about this constraint that's going on.

You may be familiar with the Hubbert Curve, which predicts that the peak of possible production volume of petroleum is somewhere in our time frame. It may have already passed, it's likely to occur before the members of the committee retire.

PRESIDING COMMISSIONER BOYD: Muriel, excuse me, I don't want to seem rude, but since, by your own admission you haven't followed this closely, the one thing you perhaps missed is in other of these seven workshops that I mentioned earlier today that have taken place, relative to the overall topic of petroleum and strategic preserves and pipelines and what-have-you, there have been fairly extensive analyses in some of

those forums and in some of the products presented in those forums of the future petroleum supply, at least available to the state. And to address that, you have to begin looking at the petroleum supply available on a broader context or a broader basis.

And I don't mean to cut you off, I just want to inform you of that fact --

SPEAKER STRAND: Thank you.

PRESIDING COMMISSIONER BOYD: -- and there is data you can refer to for the future.

SPEAKER STRAND: Thank you. I would continue by saying that it is, I think, very important to look at the supplies. It's talking about demand, and so without looking at the supply constraints seems, you know, kind of like a fantasy.

And as we start to look forward to that regime of petroleum depletion, I'd like to share with you a calculation I've made that gives you a feel for how cheap gasoline really is currently. If I took an athletic person and, for minimum wage, on a bicycle generator, asked them to generate for me as much energy as is in a gallon of gasoline, what do you think that equivalent

gallon would cost? At least $500, and that's just the available energy.

So that's my rule of thumb for the sustainable economy. And it's a huge difference from where we are now, but it's a concrete, tangible way to get us to start thinking, what is that rule going to look like? How are we going to live?

And while that number may seem like a recipe for hardship and deprivation, it's my professional engineering opinion that the technology already exists which can provide a perfectly comfortable lifestyle at that energy price. Last year, Amory Levins made several very interesting presentations to CEC and ARB staff which began to explain how this can be. Other researchers of various kinds have also been hard at work in the last 20 years, even though concerns about an oil crisis and oil prices have fallen off the political radar screen.

Now, in terms of seriously reducing petroleum dependence, we have a problem of political build. So I would recommend that you consider including in your program a serious media campaign, whereby consumers and citizens can't

avoid knowing about the time line of petroleum depletion, and can't avoid knowing about some of the viable solutions that already exist, where it's just a question of implementation.

Another important aspect of such a serious media campaign would be making people aware of how much of their work time could be turned into leisure time by rearranging their existing lifestyles into different and also perfectly comfortable lifestyles. How many people realize that per capita US energy use in 1950 was half what it is now? How many people think their parents were living in deprivation and hardship in 1950?

Another important aspect, in my opinion, of such a serious media campaign would be to address people's generally unrealistic fears of what will happen to them and/or their children if they get out of their cars and walk, ride their bicycles or take the bus. Psychological research has demonstrated that perceptions about crime rates are actually much more strongly associated with preferential TV reporting of violent crimes than are actual crime statistics.

On the subject of economic analysis, I

would say price signals work. I suspect that we're better than generally most of the strategies that are suggested in the draft report, and by price signals, I mean on the order of real increases in petroleum gas prices at the pump.

There are two ways to get these kinds of really effective price signals. We can put them in place now, consciously and sensibly, or we can wait until they are forced upon us and cause dislocation.

When I was in graduate school, 10 or 15 years after the oil crisis in the '70s, it was perfectly clear to my professors that price signals had been extremely effective over the medium- to long-term at inducing conservation throughout the market and in virtually every industry. Moreover, it had become crystal clear that increased energy prices did not mean an inevitable economic catastrophe. A serious media campaign should make sure that consumers can't avoid knowing about this.

Cost benefit analyses: I have a serious theoretical problem with cost benefit analyses. I really just don't believe in the theory. Calculating consumer surplus from a utility

function is, in my opinion, a fantasy, particularly since utility is not a mathematical function. Utility is a subjective, individual judgment about the usefulness of exchanging a certain portion of one's income or wealth for a particular good or service. The accuracy of such judgments is only as good as the true information known by each person.

In an era where income disparity is growing rapidly, using prices as a surrogate for utility lumps together the consumer surplus that rich folks enjoy with the consumer deficit that poor folks are burdened with. Moreover, the typical consumer surplus graph with prices on the Y axis can delude the analyst into thinking we can actually measure the utility that prices are a surrogate for. Replacing the price function with the utility function makes it impossible to avoid noticing that the graph is no longer a graph, but a diagram that can't be scaled.

Since utility is an individual subjective judgment, the proper place for a discussion about whether a particular project makes sense is the political arena, where discussions about who wins and who loses belong.

Hiding behind fake measurability is just a way to hide the fact that, as usual, rich people win and poor people lose.

And one last comment about reducing petroleum dependence by reducing vehicle use, Caltrans should be involved in this discussion because building more roads is not a way to reduce driving. Thank you very much for the opportunity to comment.

PRESIDING COMMISSIONER BOYD: Thank you.

SPEAKER KNUDSEN: Good afternoon. My name is Gretchen Knudsen, and I am with International Truck and Engine Corporation. I am very hungry, so I am going to try to make this brief.

(Laughter.)

SPEAKER KNUDSEN: I have a question, particularly for either Dan or Susan. I noticed in the program milestones that it didn't look like there was an opportunity to provide written comments on Task 1.

CEC STAFF BROWN: Well, I think what we planned to do, when the report is released mid-April, we will establish a reasonable time frame after that for public written comments.

SPEAKER KNUDSEN: Okay. I'd just like to comment briefly. International Truck and Engine Corporation is involved in the light-duty diesel market. We provide engine products to Ford that are put into their Power Stroke and a couple other vehicles. Just on the light-duty analysis, I'd just like to reiterate that on the net petroleum reduction -- I'm sorry, the net gasoline reduction, that it really should be a net petroleum reduction. You should really be looking at the gallons of gasoline displaced or the gallons of diesel displaced, you shouldn't be trying to equate those on a volume basis.

As far as they looked at small cars and large vans, I'd also encourage staff to look at SUVs. That seems to be a market area that consumers like, larger vehicles, the heavier vehicles, and the light-duty diesel or employing a diesel engine in those vehicles might be a way to provide some additional fuel economy.

With regards to consumer response, we've had a very positive consumer response with our engine products in the light-duty vehicles. In fact, the Power Stroke truck version is so popular they've got a web site. The consumer group that

chooses that particular vehicle is very enthusiastic, and I think that that just reiterates, those that are enthusiastic about diesel, the reasons for that are the engine performance, the fuel economy, the torque, the range, and when you look now at where the technology is headed, you've got reduced emissions, you don't see anything coming out of the tailpipe, there is reduced noise.

When you look at the European experience, you have, I think -- you've got luxury car buyers, which tend to be more discerning, buying and choosing to buy the diesel option. So I think that's something that's important to note.

Also, light-duty diesel vehicles would also provide flexibility with using the bio-diesel option and also Fischer Tropsch fuel, so I think that if there are more of those vehicles in the market, the consumer has more choice, choosing what type of fuel to employ into their vehicle. And also, the Commission and CARB would also have more flexibility in trying to provide fuel choices to those consumers.

Just last, I would like to address the health concerns. And I think I would just

encourage staff to look at all technologies with an evenhanded and fair mind, and to do analysis looking at current literature that's out there. The technologies are changing, the health analyses are changing. There are studies that are coming out every day that are showing different things, and I would just encourage staff to look at the literature.

Also, I know that BP has come out with a study. I understand there are some internal studies as well from CARB, and I would just encourage staff to look at all of those and just really see -- I would hate for the health concerns to get stuck where we are right now, and miss an opportunity for future years. Thank you very much.

ARB CHAIRMAN LLOYD: Can I just comment on that? I hear what you're saying. I thought we are taking into account those health concerns; in fact, that's why we took some actions in making sure we ruled diesel in and not out.

The other part I would take issue with your comment here about ARB's diesel-precluding LEV II emission standards. It's health-protecting emission standards, and I think it doesn't help to

talk about that issue because, in fact, you can meet the standards. Maybe not now, but historically that's been happening, and so we have faith in your ability. And I think trying to relax the standards because we know these are health-protecting, not diesel-precluding, that -- I think I'd really take offense at that.

The other part about we have seen, and I've just not long returned from Britain, where, in fact, they are seeing the air quality impact of the laxer NOX standard, much more lax than we have here. And they have NO2 problems, nitrogen dioxide, which is a health effect precursor to ozone. And if you look at some of the air quality regions there, I think there's a direct correlation between the increase in diesel sales and that impact of NO2.

So, I think, in fact, what we're doing is protecting the health of Californians, but we're not precluding diesel, and, in fact, as you see in the analysis here, we expect the industry, as they have in the past, to step forward in conjunction with the fuel industry who will provide the diesel.

And on the health stuff, we set those

standards, based on the results. We're aware of some of the recent areas, recent studies there. I don't think we're saying anything differently, and I'm aware you sponsored many of those studies to look at these. But, as I said before, I think we need to move ahead and get beyond that, because you can do it. You're doing it. You're doing a great job, as we've seen with your buses.

SPEAKER KNUDSEN: Thank you.

SPEAKER KRAMER: I'm Dick Kramer, Richard W. Kramer, Kramer Engineering.

Regarding health factors, I'm not sure, have you been considering societal costs of health factors in your cost comparisons?

CEC STAFF FONG: This Task 3 report focuses on what we call direct monetary elements. Task 1, which is now being finalized by another group, those results include all of the various environmental public health aspects that are related to the use of petroleum fuels.

And so we hope that within a couple of weeks, those results can be married to the Task 3 results and we'll have a complete picture of how these different options compare from an overall societal impact.

SPEAKER KRAMER: Very good, thank you. I think when we do have that information included somehow or other in the cost that the consumer realizes, that would help move us toward something more healthful. Besides the question, I believe that there are other ways that we can get power to vehicles that we have not fully explored, ways that are less costly from the energy point of view, and more healthful.

Thinking of vehicles that use power from an external power source, and I like the concept of external power source because portable engines cannot be as efficient as stationary engines, and they are limited to the fuel or energy that they can carry on board. And so they have those limitations, whereas external power sources can be solar or wind or hydroelectric or whatever efficiency fuel cell or other power generation might be available.

I think that if we would consider possibly something in the way of a variation of the San Francisco cable car, which would not be limited to the low speeds of the cable car but it would be a system by which power would be available in a roadway lane, a vehicle could get

onto that lane and reach into a slot through the surface of the pavement, as the cable car does, to get hold of that power. And consequently, be able to take advantage of external power sources for moving the vehicle.

This concept, if applied to major traffic lanes or traffic lanes, one or more of major traffic routes, I should say, on not all roads but certain selected routes, could extend the range of electric vehicles indefinitely. And I think that basic concept has real great possibilities that ought to be explored. Thank you.

CEC STAFF FONG: Thank you.

PRESIDING COMMISSIONER BOYD: Thank you.

SPEAKER TAYLOR: My name is David Taylor. I'm with NXE Energy, co-founder of a new company. I'm here to make an announcement, more than anything else.

Our company now possesses the technology to produce LNG as a supply source, of course from natural gas, at any remote or any specific limited location, meaning we could produce LNG in a gas station that has natural gas to it on small volumes, without storage requirements or very

limited storage requirements.

This technology was developed in France at the University of Paris by a scientist, the second leading scientist in the world in this type of application, who is the head of a team of 150 engineers. And we now have gone through the alpha and the beta testing, we have a working model in Paris, and we're bringing it into this country to start off into the production of LNG in limited sources. We can produce 500 gallons a day or 30,000 gallons a day without having to put storage.

And the biggest handicap as I see in this country has been storage, because of the restrictions upon storage capacities, because of the volatility of the LNG in such storage, and the expense. We can put a liquid station together for $100- to $150,000, where the common liquid station today is, we all know, $4- to $600,000, because of storage requirements.

So I just wanted to make that announcement, that we are working on and working with the Energy Committee in the US Congress. I'm working with everyone I possibly can to get the information out in full details, and also make

contact with some of your agency.

We also have another technology out, I'll just give you some knowledge, it's not completed. It's for power generation. We're going to have power generation without fossil fuels. We're using bubble technology. And we've already done the alpha testing, we're in the beta testing. And until we get through with the beta, I don't want to discuss it.

But we think we're going to find your use for your natural gas and take it away from power generation and come up with some power generation technology. We'll be building these units in four-megawatt plants that will be major, and this is also developed in France by a different scientific group.

So if you're looking for supply, and we know we can produce, based upon several factors. If the utility company can get the natural gas to us at a reasonable price, at $2 per thousand, we can produce gas, LNG, for 23 to 32 cents a gallon, before the taxes and everything else, of course.

So we'd like to meet, discuss, work with and do whatever we can to implement this. Because I think, not just for the special vehicles that

you all are concentrating on, I think the general public needs to have this. And until you have an infrastructure built in place, and that's going to take not a great amount of time with our technology, that you'll have acceptance.

And the trucking companies, as you may know, are holding back. Speaking to your agency, I found that out, that they don't want to go to LNG, where they have a composition of two fuels, which then they have to have approval on those engines and it takes a lot of time. What I'm attempting to do is get Congress to extend the conversions from the $2,000 that they now give you a tax credit for to $4,000, because it costs $4,000 to make a conversion to LNG on an automobile.

Getting them to make special concessions to the retailers, to give them a discount per gallon sold, meaning that they would be able to have a rebate from their taxes, retailers, for making the installation of $150,000 into their facility. And then getting some type of regulation where the utility companies cannot take and charge excessive prices for the gas after it passes the city gates, and get it to where we can

retain two to three dollars per thousand. As we all know, that's about one to two million BTUs, depending on the two dollars per million BTUs, or per thousand cubic feet.

So I don't want to take any more of your time, I was the last one in here, and I was here coming just to get the information out, because we've been very busy contacting everybody we can. I've been blitzing the state legislature, John Burton's office and everybody I can to get the information out to all the energy committees. It's a political thing, we're going to need political assistance, and it's going to have to be from the federal and the state level.

And I think the answer is in our hands at this time and all we have to do is just move with it. I thank you very much for your time.

CEC CHAIRMAN KEESE: Thank you. And I'm sure our staff will be interested, because I know -- I believe we've approved some one-million-dollar LNG project, so I'm sure that if you have something that can handle it more efficiently, we'd be happy to hear about it.

SPEAKER TAYLOR: Storage facility. Someone spoke of Harris Ranch. Harris Ranch put a

facility up for 10- to 20,000 gallons. It cost half a million dollars just for the storage facility. When we --

CEC CHAIRMAN KEESE: I think we paid for that, so --

SPEAKER TAYLOR: Yes. I think --

CEC CHAIRMAN KEESE: Talk to our staff. No, not that one? (Laughing.)

Thank you.

SPEAKER TAYLOR: Thank you very much.

PRESIDING COMMISSIONER BOYD: Anyone else? This gentleman was waiting to clean up.

We will break for lunch, one hour. See you back here at 2:00 o'clock.

(Thereupon, the luncheon recess was held off the record.)

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A F T E R N O O N S E S S I O N

PRESIDING COMMISSIONER BOYD: We're going to move now to the Task 1 review that we talked about this morning, and again, we're going to turn the program over to A. D. Little and to Mike Jackson, so Mike, the floor is yours.

CONSULTANT JACKSON: Okay, thank you.

PRESIDING COMMISSIONER BOYD: If you can get control of this rowdy crowd.

CONSULTANT JACKSON: Yeah, they'll quiet down.

SPEAKER TAYLOR: Mike, just a clarification. Is it true that Accurex has now bought Arthur D. Little?

CONSULTANT JACKSON: One would think so, yeah.

(Laughter.)

CONSULTANT JACKSON: We're all waiting for what the name will be. As long as it starts with an A, it's okay.

I've thrown back up the slide here that shows the overall Task 1 approach, and again, we've divided it into four supplements: air impacts, multimedia impacts, economic impacts, and other transportation-related impacts.

Today, this afternoon we only want to concentrate on the air impacts. And these other ones we have shown at the previous workshop a little bit. We're going to have more detail on this when the report comes out, and then you'll have another chance to look at a presentation on these other elements, April 15th workshop. So today what I want to do is concentrate only on the air impacts, and really only on the emissions that are associated with each of the options.

In the previous workshop we talked about one option, and that was improving fuel efficiency, and what effect that would have on both the fuel cycle and vehicle emissions. And we presented some numbers in terms of emission reductions for that option, as well as we've presented some numbers in terms of monetizing the benefits of those reductions.

Today we're not going to talk about monetizing either. We're just going to talk about how you calculate the emissions, from the upstream or the fuel cycle part of it, and how you calculate the emissions from the vehicle, and what those benefits are compared to the baseline.

So I'm going to let my colleague, Stefan

Unnasch, walk through the methodology we have here, and what we're looking for from the audience is feedback on whether we've got this right, relative to the various options, how we've calculated the emission reductions in comparison to the baseline, and keep -- you know, when you're listening to this, try to pick out those areas, the assumptions that you agree with or don't agree with, and that's where we're looking for feedback.

So with that, Stefan, why don't you come up.

CONSULTANT UNNASCH: Thanks, Mike.

So today I'm going to go through the emission impacts associated with the petroleum reduction options. I'm going to go through our approach for analyzing -- Yeah, this isn't working. Is the microphone -- Ah, how is that, Gary? Great.

Deja vu, I was giving a talk on this subject, what was it, half a decade ago, and Gary couldn't hear me very well.

(Laughter.)

CONSULTANT UNNASCH: I'm going to go through our approach for calculating the emissions associated with the vehicles, and I'll explain

what I mean by that, and then describe the magnitude of those emission reductions for different options, and then just explain what the math is for monetizing the emissions without going into any great detail.

First, let me just try to explain the types of impacts that we can have with reducing petroleum usage. These are categories of options, so -- and these are shown on the basis of an average car. You don't have to worry about the numbers, I'm just trying to illustrate the types of impacts. So your average car uses a little bit over 500 gallons of gasoline per year, and it drives around 11,000 miles.

If you're looking at a strategy that improves fuel economy, you reduce the fuel used by that vehicle, and so you reduce the gallons per year, and that would affect the emissions associated with every gallon of fuel that's produced. However, the mileage per year is essentially the same. There is what's called the rebound effect. If you have a vehicle that's slightly better fuel economy, you might drive a little bit more, but it's very minor.

Then there are other measures that

affect vehicle miles traveled, motivations like taxes. And those would cause the driver to drive less and you would save both fuel and miles traveled. So again, what changes with the fuel used is what we call the fuel cycle emissions, and then the vehicle exhaust emissions would go with the miles driven per year. So you get an impact both on the fuel cycle and the vehicle.

Then the warm-colored, reddish-colored bars represent alternative-type fuels, and I've sort of lumped them into categories where battery and fuel cell vehicles essentially are twice or better the efficiency of gasoline. Don't worry so much about the number, the idea is you're completely eliminating the use of gasoline, but you are now introducing a new fuel which also has emission impacts -- We have to generate electric power or we have to produce hydrogen -- and you've completely eliminated the exhaust emissions from the gasoline car, but now you've replaced them with, in this case, zero emissions from the electric and hydrogen fuel cell vehicle, and there would be emissions from the methanol fuel cell vehicle.

And then when you look at LPG, ethanol,

those types of fuels, they're essentially -- they're on the order of the efficiency of a gasoline vehicle. Again, you replace the gasoline with the alternative fuel, and you drive approximately the same miles. So we need to look at the emissions associated with the vehicle and the emissions associated with producing the fuel.

So in order to evaluate these emissions, first, what are we looking at? We're looking at criteria pollutants, toxics and particulate, which we're lumping together because they have a more significant health impact, and greenhouse gases. Some of the most significant assumptions, which Dan pointed out, is that the baseline assumption for the study is that vehicles and fueling infrastructure comply with prevailing state and federal regulations.

So accordingly, the fueling stations would meet the ARB requirements and the vehicles would -- the gasoline vehicles would emit at the PZEV level, and their impact on air emissions would be consistent with the way that ARB calculates it in its inventory. So in most cases, as an example, an LPG PZEV would have the same NOX as a gasoline PZEV, because at that low level,

manufacturers have many options to meet standards and that's our assumption.

Fuel cycle, what we're looking at is also the impact on the breathers of California. We're not looking at the average emissions of all of the refineries in California, divided by the average gallon of fuel displaced. As Mike showed you this morning, there was a chart that showed over time an increase in fuel usage, and we're talking about displacing that increase. So I'll get into that momentarily.

And for the criteria pollutants, we're going to assess their monetary value. Toxic and particulate emissions, those will be determined separately, they have more significant health impacts. And the most significant point here is that the toxic emissions associated with vehicle operation are things like benzene and formaldehyde. There are five or so hydrocarbon compounds that are listed by the state as toxics, and those are calculated from the individual components in the emission stream.

Another significant assumption is we're looking at particulate emissions from hauling the fuel around from the vehicle, tire wear, brake

wear. There are other sources of particulate. A significant one is secondary particulate from NOX and we have not taken that into account. Finally, there are greenhouse gas emissions, CO2, N2O and methane. And I'll get into our approach for calculating greenhouse gas emissions.

So the notion of marginal emissions is illustrated here. If you're looking at displacing, say, ten billion gallons of petroleum out of a future demand of 30 billion, you're probably reducing shipments to Arizona, and you could be increasing the imports of finished gasoline or carbob.

Now, who knows what the market will do. There might be a part of an oil refinery that's de-bottlenecked, we're also looking at that. But our baseline assumption is that on the margin, gasoline blending stock, which would be blended with ethanol for RFG3, is imported by tanker ship and we're counting those emissions. And the way the South Coast inventory does it is they count 26 miles of tanker ship operation.

Then there's offloading emissions associated with transporting that fuel into the loading terminal, and note that the refinery is

really not in the picture there, we're just counting those red emissions.

Then if you think of the map of LA, the gasoline is pumped from the coast to an inland product terminal. There are emissions associated with the product terminal, filling the tank truck, driving the tank truck to the fueling station, and unloading the fuel. Then finally, there are emissions from fueling the vehicle, exhaust and evaporative emissions from the vehicle.

So all of these emissions, I say, you buy by the yard. If you drive a mile, you get exhaust emissions. If you use a gallon of fuel, you get the fuel cycle emissions associated with that gallon.

So we're determining basically emissions on a per-mile basis and a per-gallon basis. And I'm always going to be talking about real gallons, because there are excellent opportunities for confusion between what's a gasoline-equivalent gallon, and if you change the heating value of gasoline, you suddenly have a different equivalent gallon of ethanol. So we're doing our calculations in terms of real physical gallons, kilowatt hours of electricity, kilograms of

hydrogen to avoid the potential for confusion by others. And then, of course, we're also representing them in equivalent units.

So our method here is to determine the fuel usage for each option and the miles traveled for each option. And, as I showed before, in instances like hybrid vehicles which improve fuel economy, you're primarily reducing only gasoline usage. So that's what's illustrated with this, this is sort of an example strategy. It's a list of options, all different colors in the cylinders.

So I've shown examples here for -- the blue cylinder is reducing fuel use with hybrid vehicles. Let's say it's ten billion gallons a year, and to calculate the non-methane organic gases or hydrocarbons without methane, including methanol and formaldehyde, you multiply by the fuel cycle emission factor, which I'll show you momentarily, that's half a gram per gallon.

If you have a strategy like a fuel tax or you reduce your VMT and your fuel usage, you multiply by the same half a gram per gallon times the gallons per year and the emissions associated with the vehicle operation, and then for each strategy these get summed together, into the tons

per year, for each option. And we're counting, like I said, criteria pollutants, toxics, particulate. The particulate is going to be broken down between PM10 and PM2.5, and that's part of the monetization discussion, which we'll get into later. We'll develop a monetary value for the emission reductions, determine the value over time and perform a net present value calculation.

Dan went over the strategies that we looked at. Basically in group one you're reducing the amount of gasoline used, in group two you're swapping gasoline with an alternative fuel. Group three, you're reducing both miles and gasoline.

So let's look at the extent of emission reductions that we could expect with these petroleum reduction strategies. I'd like to go into some detail on how -- on what the emissions from PZEV and other types of gasoline vehicles are. This chart here represents all of the marginal emissions associated with operating a PZEV- or SULEV-compliant vehicle. On the right there's vehicle exhaust and vehicle NMOG emissions.

And these values here represent the in-use emissions. Those are the emissions that are

estimated over the life of the vehicle on a per-mile basis. So in order to get these numbers, what ARB had to do was run their inventory model, taking into account deterioration rates, tampering and other failure modes. So when you look at the NMOG standard for exhaust, which is the far-right blue bar, crosshatch, the standard is .01 grams per mile, and the in-use value is actually .0067, it's lower than the standard. So car makers are presumably undershooting in order to be compliant over the life of the vehicle.

Historically, vehicles have actually had emission, in-use emission rates higher than the standard because of higher levels of deterioration, and there's a lot going into this. There's on-board diagnostics and a lot of factors, so ARB expects these emission levels from PZEVs.

Another component of the emissions are the evaporative emissions. PZEVs are supposed to have zero evaporative emissions, zero sealed fuel systems. However, due to certification requirements and other issues, ARB has assessed what would the real in-use emissions, evaporative emissions from PZEV be, and the value that's in the inventory, and this is documented in the ARB

staff report from the ZEV workshops in 2002, .02 grams per mile.

Then moving to the left, they're fuel cycle emissions, so the red bars correspond to hauling gasoline around. And this primarily involves tanker ship emissions and tanker truck emissions transporting the fuel to the local fueling station. Prior to 2007, the tanker ship and the tank truck emissions were about equal, but after 2007 a 90-percent reduction in NOX and particulate is supposed to take into effect. So now the truck exhaust emissions are a smaller part of the total fuel cycle NOX, and that's reflected in this chart here.

Finally we get to the huge array of fuel cycle emissions that correspond to the hydrocarbons. These include the hydrocarbons from the exhaust of the tanker ship, the exhaust of the tanker truck, evaporative emissions from the vehicle, refueling spillage. About the biggest number there is the vehicle refueling emissions, and the next biggest number is the vehicle spillage.

The spillage is estimated now to be about .1 grams per gallon, and that's pretty low.

And the evaporate emissions should be about .17 grams per gallon. These here are expressed in grams per mile. And that basically involves having all of the fueling stations in California operate with 95 percent control efficiency with zero defect rate.

Historically, the emissions inventory has included a defect rate for refueling stations, so if your defect rate was five percent, effectively five percent of the refueling stations don't control the emissions as well, and that solid blue bar could go quite a bit more to the right.

When we look at the emissions -- Now I've just illustrated the emissions form battery EVs and fuel cell vehicles here. These correspond to the power plant emissions and the emissions used to haul natural gas into the South Coast Air Basin. We've done this analysis for battery EVs and fuel cell vehicles, battery EVs on the basis of producing electric power from natural gas, which is what we believe to be the marginal source of power.

I don't believe -- There is no attribution between nuclear power plants or

hydroelectric dams and electric vehicles. If you operate more electric vehicle miles, you're not going to get any more power out of a nuclear power plant. So the fuel cycle impacts here correspond to the production of power in natural gas plants.

And what's shown here are the emissions in urban areas, and we're also calculating the emissions outside of the South Coast Air Basin and taking those into account.

So that shows kind of the range of emissions. With some fuels, there's a few emissions that were changed. For example, methanol fuel cell vehicles would have zero NOX emissions or a number very close to zero. Daimler Chrysler claims it's zero. Methanol and ethanol vehicles would have somewhat lower evaporative emissions, and there are a few others. And those are illustrated here.

Now, these are shown, the fuel cycle emissions on the left are shown on a gram-per-unit fuel basis. It makes for an impossible comparison amongst the fuels, but that's not what this chart is for. It's to allow us to take the billion gallons of gasoline or gigawatt hour of electricity or hundred million kilograms of

hydrogen used in one of the options and to calculate what the total emissions would be in the state for each of the fuels within an option.

So you can see some of the differences, though, on a per-gallon basis. They're sort of subtle; I'll point them out to you. LPG has somewhat higher NOX emissions, because we're considering LPG that would come from natural gas, that would be brought in by rail car from Wyoming, and there would be more emissions in urban areas because, number one, you'd be doing some of your shipping by rail rather than truck. And secondly, there would be greater rail transportation distances than the short distance from refineries in California.

Other nuances: Ethanol, methanol, Fischer Tropsch, diesel have lower vapor pressures; therefore, lower hydrocarbon emissions or NMOG on a per-gallon basis. Compressed hydrogen reformers produce fairly low emissions. So all of those factors and more go into these fuel cycle emissions.

And the vehicle emissions are shown on the right. Some of the values are what you would expect or obvious, electric and hydrogen fuel cell

vehicles have zero exhaust emissions; methanol vehicles, zero NOX emissions. In some instances, the hydrocarbon emissions we would expect to be lower for some fuel options, primarily in the area of evaporative emissions. And this would apply, again, to the very low vapor pressure fuels like diesel, synthetic diesel, LPG, and a few others on the list.

So these emission factors, so to speak, in grams per mile, are applied to the fuel options that cause changes in the miles driven for gasoline and increases in miles driven by an alternative fuel. And then the fuel cycle emissions on the left allow the fuel cycle emissions for gasoline and the alternative fuel to be calculated.

The next category of emissions is toxics and particulates. We determine the toxic emissions from the sources of hydrocarbons within the vehicle and fuel cycle. So for each category of hydrocarbons, we lump them into about eight categories. There's diesel exhaust, diesel spillage, diesel vapors, and I say diesel a lot because that's a big part of the fuel cycle; tanker ships hauling the fuel, tank trucks.

Then there's spilled gasoline and gasoline vapors, and they have different compositions of hydrocarbons in them. For example, spilled fuel wouldn't have any aldehydes in it; those are products of combustion. But liquid fuel basically contains the composition of the liquid fuel, so if the liquid fuel contains two percent benzene, two percent of the NMOG that's spilled would be benzene.

Also shown here are the particulates associated with vehicle operation and combustion, so for the battery vehicles and the fuel cell vehicles, these are particulate emissions from power plants. And we're also showing tire and brake particulate matter.

Now, in order to come up with an evaluation for the toxic emissions, we're working with ARB to model the impact on emissions and breathers in California, where they're looking at an inventory of particulate emissions and determining, depending upon population profiles and where the inventory occurs, what the health impacts would be and the mortality and using standard factors for mortality to determine the dollars associated with particulate emissions.

Now, we're also going to apply evaluation to the toxic emissions, and that's shown in the following chart here.

ARB CHAIRMAN LLOYD: Stefan --

CONSULTANT UNNASCH: Yes?

ARB CHAIRMAN LLOYD: -- would you take into account secondary PM?

CONSULTANT UNNASCH: At this point, no, because it wasn't part of our, you know, going in -- The way we thought we were going to work with ARB and model the emissions didn't quite turn out the way I thought. What we're going to do is look at the Mates report to assess the mortality effect of these other toxics.

And at this point we don't have included in a study any secondary PM, although that's something that would be interesting because the impact could be huge.

ARB CHAIRMAN LLOYD: Well, when you talk about fuel cycle, one assumes that should be included.

CONSULTANT UNNASCH: Right, and this only dawned on us as we were talking with ARB, how they were going to model the health impacts. So this is a fairly recent development, as we've come

to understand exactly, you know, what the best way is to determine these monetary values. So that's something that we could still include.

So what these bars here show is a re-weighting based on the mortality results in the Mates study. So suddenly the tire and the brake particulate, which was so big, is now smaller because it's larger, and the little sliver that was one three butadine suddenly shows up as a red bar. And formaldehyde has a smaller effect than other toxics, like benzene.

So, like I said, we're looking at the dose response model, at the Mates study, and having some way of including secondary particulate would probably be appropriate.

The next category of emissions is greenhouse gas emissions. Greenhouse gas emissions are determined by looking at all of the energy inputs into a fuel production process, and let me just explain what one of these stacks of bars is that you're looking at. The blue-striped bar represents a megajoule of fuel, or a million BTUs, whatever.

So to produce one megajoule of gasoline from petroleum, that requires energy inputs on the

order of ten percent additional energy from petroleum, another 15 percent from other fossil fuels, and in this case it's modeled as natural gas at the refinery, and there is also some non-fossil fuel that crept in there which may be associated with power -- These slivers catch you at the awkward moments.

In the case of diesel production, there is about ten percent less energy used to produce a similar unit of diesel fuel. And similarly, when you think about producing methanol, the number that's tossed around is about 70 percent efficient or 71 percent efficient on a higher heating value basis, or 68 percent efficiency on a lower heating value basis. And if you take the blue-striped bar, divide by the total bar, minus the brown one which is the diesel fuel used to haul the methanol around, that is indeed 68 percent.

So for each of these fuels we determine the energy inputs, and then calculate the greenhouse gas emissions associated with those energy inputs.

It's very fun to look at some of the other fuel options, like biomass-based fuel production. In the case of ethanol from biomass,

almost all of the energy input is envisioned to be something like agricultural waste or forest material. So the green-checked bars represent the biomass or non-fossil fuel energy input. And then the fuel itself is also a non-fossil fuel. And here again, the brown stripe represents the petroleum used to move the ethanol around.

So the following chart here shows the greenhouse gas emissions that were calculated for each of these fuel options, and these are shown on a gram-per-gigajoule basis, and it's a combination of the vehicle and the fuel cycle. And this is very helpful to do, because I've seen so many people make mistakes. They've accidentally combined the wrong factors.

And all you have to do to figure out the greenhouse gas emissions from a gasoline vehicle is to say the vehicle gets, that there's 11,300 grams of greenhouse gas associated for each gallon of gasoline, and you divide by the fuel economy, call it 35 miles per gallon, and that gives you the greenhouse gas associated with operating that vehicle, for both the vehicle and the fuel cycle combined. You could break it out, according to the ratios on those little yellow and blue bars,

but really, all it boils down to is multiplying -- taking the greenhouse gas factor and dividing by the fuel economy.

So for each of the fuel options in the report, we're showing these greenhouse gas factors, and I just showed it to you in conventional units as an example for gasoline and diesel.

Just a few other nuances here. The lower greenhouse gases per unit of energy for diesel reflect the lower energy input. Similarly, for LPG, much higher energy input for making synthetic diesel. Greenhouse gases per unit of fuel are almost the same for methanol and gasoline. Ethanol from corn has about half or 60 percent of the fossil fuel input per unit of energy produced.

Interestingly, hydrogen has about the same greenhouse gas emissions per unit of fuel as does gasoline and electricity, which is almost -- is very efficient in the vehicle, takes a little bit more energy to produce per unit of fuel.

And this again, this electricity efficiency is very important, because if we're looking at a strategy over the next 50 years, we

have to consider what the mix of power plants in California is going to do. So right now, the marginal generation in California is not so efficient, but over time the older power plants in the inventory will eventually turn over.

Now, in order to determine the total impact of the emissions, we need to know the implementation, rates of all of the different fuel options, so those will be combined to determine the tons of emissions every year, and the total tons and the net present value.

So now let's look at some of the tonnage impacts from some of the different fuel options. I'm basically summarizing here the fuel economy, average fuel economy from some of the different options, and these come entirely, these come from the Task 3 report.

So a baseline vehicle throughout the study gets about, a light-duty vehicle gets about 21 miles per gallon, and with a very aggressive extent of hybridization that could be dropped or improved to about 45 miles per gallon, in that strategy. And the brown diamonds show how gasoline usage would drop from 30 billion gallons per year to almost a par with today's levels, so

that would be great if that one could be fully implemented. The other strategies, diesel, as Dan said this morning, is almost a quasi-group two category, where you're swapping diesel for gasoline, and so it's a little analytically tough to look at.

Now, looking at the -- we're determining the total emission impacts for both the fuel cycle and the vehicle, which you may -- we're determining the emissions impact from both the fuel cycle and the vehicle, which you may or may not be able to read. The point is better illustrated when you look at just the particulate emissions as an example for the group one options.

So in the case -- the first three blue bars simply involve improving the fuel economy of the vehicle. So you're basically reducing the amount of gasoline used by 10 up to 18 billion gallons per year. So the particulate emissions correspond to the reduced emissions from tanker ships and tanker trucks for those strategies.

Now, in the case of a diesel, it's a more complicated strategy because you're -- First of all, the level of diesel penetration is smaller. That small blue stripe represents a much

smaller level of diesel penetration in that option. And now you have to consider the fuel cycle emissions associated with hauling the gasoline, the small round stripe below, which is the fuel cycle emissions associated with hauling the diesel, almost identical. And then you have the particulate emissions associated with the gasoline vehicle and the particulate associated with the diesel.

Now, there was some discussion about emission controls of diesels, and what these values show are vehicles that are meeting the California particulate standard for diesel, which is quite a tight standard, and also the particulate value that's used in the California emissions inventory for gasoline vehicles. And I've been told that that number really does require some more examination. Some folks think it might be a little bit high.

So the diesel light-duty vehicle option would result in a significant increase, if you count tons, and I apologize for the switch with the handouts. And these types of impacts are something that you would want to pay attention to.

Now, looking at the group two options,

these are primarily alternative fuel options where you're replacing about ten percent of the gasoline. And you can see with the bar, the diamond on the left, you're starting at 30 billion gallons per year, and each of these options has about a ten-percent impact.

Now, of course, we're going to have to look carefully at how we sum up these options. You just can't sum up everything, because if you have all the gas -- all the vehicles are hybrids and ten percent are battery electric, there is a disconnect there. So that needs to be worked out. But this illustrates the extent of the fuel displacement for each of these options.

And again, we calculate the fuel cycle, the fuel cycle NOX, the fuel cycle and vehicle pollutants, and I have to apologize for a few typos in the handouts, and then we can look at the example of particulate emissions corresponding to these alternative fuel options. And here again we have to take into account the particulate associated with the gasoline gallons that were eliminated, particulate associated with the gasoline vehicle, and the levels of particulate associated with the alternative fuel options.

Now, these here aren't showing the brake and tire PM, although we're also taking those into account, and for the hydrogen -- for the electric drive vehicles, we're actually analyzing a reduction in particulate due to improved braking, due to regenerative braking. But this right now is just showing combustion particulate.

So you can see that for many of the alternative fuel options, the particulate emissions are considerably lower than those of the gasoline option that they displaced. In the case of LPG, the vehicle, we assumed it was essentially the same, it complied with the same standards as the gasoline PZEV, so both the vehicle and fuel cycle particulate are comparable.

Let me now go into sort of a sensitivity analysis and explain what some of the uncertainties are associated with these calculations. This chart shows the contributions towards total NOX emissions and PM emissions for tank truck driving and heavy-duty emission standards. So the tank truck represents about ten percent of the total NOX or particulate emissions, and that's what that baseline line means. So the tank truck is ten percent and the marine vessel,

which I didn't show here, is 90 percent of the emissions.

If the heavy-duty emission standards for trucks don't end up being implemented, that contribution of emissions would increase by the factors shown there, by the big red bar. So that shows that the emission standards and implementation of those is a much bigger factor than how far the truck drives.

What's also shown here is kind of the degree of conservatism amongst these assumptions. So I've indicated that the baseline assumption for the -- as far as the emission standards go, is kind of on the left-hand side of things. It's hard to imagine that things would be much cleaner. But again, that's complying with prevailing emission standards.

Similarly, for NMOG and toxics, which is proportional to NMOG, refueling spillage is about 21 percent of the total NMOG, and in my view it could be a lot worse, but this is a standard that is continuing to be tightened, so we believe that the baseline value is quite close to as good as it can get.

There is also -- Another important

factor is defects in the vapor recovery system for vehicles. The defect rate is assumed to be low for gasoline fueling stations, and if it were higher, it could have a bigger effect on NMOG emissions. So if you sum up the two blue bars, you could have roughly double the level of NMOG emissions associated with driving the vehicle.

Now, when you look at greenhouse gas emissions, the primary point here is that vehicle fuel economy is the number-one factor that affects greenhouse gas emissions. That's a -- Kind of everyone knows that, but for every mile-per-gallon change in vehicle fuel economy, you have a gram-per-mile proportional change in greenhouse gas emissions. And in my view, the uncertainty and the potential for improving fuel economy is far greater than many of the assumptions that go into the greenhouse gas emissions, such as the energy input into the refinery or the N2O emissions from the vehicles.

So those were the emission impacts associated with the vehicles in the Task 1 report. We're going to quantify them on a ton-per-day basis and perform the net present value calculation. We'll also be doing the

monetization, which will be looking at the value of NOX and particulate emissions, based on ARB's model of the health impacts, and we're looking at a market value for criteria pollutants.

And, in the case of greenhouse gas emissions, which is trickier, the yellow bar there shows trading in greenhouse gas emissions has occurred and the cost of control for greenhouse gas emissions is all over the place, to arguably, or to negative, to very low values for reforestation or avoiding deforestation to quite high for sequestering CO2 from power plants or other industrial processes.

And in determining the monetized values, we'll be doing an MPV calculation, which is lots of fun, and that will be used to provide a figure of merit to describe the indirect benefits associated with these petroleum reduction strategies.

So, with that, I'd like to welcome any questions and perhaps defer the fuel-economy-related questions to the Task 3 group.

PRESIDING COMMISSIONER BOYD: Thank you, Stefan. Any folks out there want to venture up and get into this one?

(Laughter.)

PRESIDING COMMISSIONER BOYD: My economist friend, Richard.

SPEAKER MC CANN: Okay. This is an electricity question, for which I put on a completely different hat. I was looking at your NOX emissions from battery electric vehicles, and the emission rate in the South Coast District for, actually for an average emission rate is around .2 pounds per megawatt hour.

You might get a really clean turbine that's putting out .015 pounds per megawatt hour. And the ZEV fuel economy or energy economy --

CONSULTANT UNNASCH: Well, let me interrupt you.

SPEAKER MC CANN: Yeah.

CONSULTANT UNNASCH: If you were to add an extra 600 megawatts of generation capacity with a new power plant in South Coast, do you know what the emission rate would be?

SPEAKER MC CANN: .015 pounds per megawatt hour.

CONSULTANT UNNASCH: Zero.

SPEAKER MC CANN: No.

CONSULTANT UNNASCH: Zero.

UNIDENTIFIED SPEAKER: Minus.

SPEAKER MC CANN: What?

UNIDENTIFIED SPEAKER: Minus.

CONSULTANT UNNASCH: Zero, because the reclaim program requires that there is a bubble on emissions in the South Coast Air Basin, so --

SPEAKER MC CANN: No, that --

CONSULTANT UNNASCH: -- you cannot have, you cannot produce additional electricity or you cannot make power from power plants and produce excess NOX emissions. I mean, that's what the law says.

Now, you can say that maybe the program doesn't work, and maybe that's a sensitivity that should be looked at, but --

SPEAKER MC CANN: Yeah, I asked the immediate question what if they build it in Ventura at the Ormond Beach or the Mandalay power plant sites --

CONSULTANT UNNASCH: Well, those are outside the South Coast --

SPEAKER MC CANN: Barely.

CONSULTANT UNNASCH: -- and we've --

SPEAKER MC CANN: Barely outside.

CONSULTANT UNNASCH: Yeah, we've --

SPEAKER MC CANN: That's not -- I mean, this is -- And the other thing is, is that when you do build the additional electricity generation, that takes away from other industrial sectors in the region, in terms of their ability to construct or to issue emissions as well.

So, you know, when you're using this institutional cap --

CONSULTANT UNNASCH: Right, so they're reducing emissions.

SPEAKER MC CANN: -- you're pushing on other sectors of the economy in terms of those kinds of emissions.

CONSULTANT UNNASCH: Right.

SPEAKER MC CANN: And I think that that's really, that's a real arbitrary leap. It's a little bit like -- I don't know if you folks are still using that zero cost of emission compliance after 2010 assumption? That was one that was put up in the last workshop, that there was a zero cost of complying?

CONSULTANT UNNASCH: Oh, that's another -- This is just about emissions.

SPEAKER MC CANN: Right. Okay, yeah, that one is about monetizing the emission

benefits. I mean, there is -- there are costs -- even though once you get to a standard, there is a cost of complying with that standard in the future. And it's the same thing here, that --

CONSULTANT UNNASCH: Well, yeah, this is just about emissions.

SPEAKER MC CANN: Right.

CONSULTANT UNNASCH: But just to address that point. The point of the reclaim program is to make the air cleaner, and if the South Coast Air Quality Management District didn't believe that the reclaim program was going to make the air cleaner, they probably wouldn't have done it.

SPEAKER MC CANN: No, but it also --

CONSULTANT UNNASCH: Also, other power plants even in the Bay Area require NOX offsets.

SPEAKER MC CANN: Right.

CONSULTANT UNNASCH: And, indeed, they do take away from our --

SPEAKER MC CANN: Right, that's true everywhere.

CONSULTANT UNNASCH: -- pollution potential --

SPEAKER MC CANN: All of the power plants, from that perspective all of the power

plants in the state then have zero emissions, because they all require ERCs.

CONSULTANT UNNASCH: Right.

SPEAKER MC CANN: I mean, if you're making that argument. The problem is, is from a monetizing standpoint, the fact is, is that that increase in emission actually -- your power plant, you have to buy emission offsets from someone else.

CONSULTANT UNNASCH: Right.

SPEAKER MC CANN: And so there is a dollar amount that you have to put out for .015 pounds per megawatt hour.

CONSULTANT UNNASCH: Well, that's another --

SPEAKER MC CANN: That's a dollar output, and --

CONSULTANT UNNASCH: That's another task.

SPEAKER MC CANN: -- you need to account for it.

CONSULTANT UNNASCH: That's another task.

SPEAKER MC CANN: But it's not accounted for in your analysis.

CONSULTANT UNNASCH: Yes, it is. Yes, it is.

SPEAKER MC CANN: Okay.

CONSULTANT UNNASCH: It's another task.

SPEAKER MC CANN: Okay. It's just it's not clear in that analysis of that.

CONSULTANT UNNASCH: Well, we're just calculating the impact, you know --

SPEAKER MC CANN: Well, it has the same effect --

CONSULTANT UNNASCH: -- you know, monetizing the emissions. There's all sorts of stuff like the nickel metal hydride battery and the hybrid vehicle costs money.

SPEAKER MC CANN: Well, this actually holds for the refineries too, then. The emissions from the refineries are zero because they're under the same reclaim cap.

CONSULTANT UNNASCH: That's right.

SPEAKER MC CANN: So the refinery emissions should be zero as well.

CONSULTANT UNNASCH: They are.

SPEAKER MC CANN: Okay.

CONSULTANT UNNASCH: Yeah, they are, and we've reviewed this extensively, and I cannot

emphasize that word enough. And there are a few people in this room who have been witness to that, with the oil industry. We have a fuel cycle study we worked on with ARB in 1996 and we participated with about a dozen stakeholders from oil industry, electric, all fuel groups.

And we went over this marginal average business again and again, and there was a great degree of interest in believing that the appropriate way to analyze the effect of a strategy was to look at the marginal emissions. Because that represents what the breather and what the Air District thinks the breather is breathing.

SPEAKER MC CANN: No, I absolutely agree, I agree that's the right way to do it. I'm just concerned about the fact that if you're missing things in this physical modeling, that you end up washing through to the economic costs, and that's --

CONSULTANT UNNASCH: Right. Now, in terms of economic -- you know, if someone has to buy offsets, there are a lot of things that are expensive in these strategies and they all need to be considered one way or another in another task.

SPEAKER MC CANN: Okay. Well, it's

actually -- I guess it's supposed to be part of Task 1.

CONSULTANT UNNASCH: Well, another subtask.

SPEAKER MC CANN: A subtask, okay. All right, thanks.

SPEAKER TURNER: Sean Turner, Natural Gas Vehicle Coalition. I actually have a question about your particulate emissions graphs, where you've got bars above and below the axes, and I'm trying to understand the significance of the different sides.

CONSULTANT UNNASCH: Right.

SPEAKER TURNER: Are these supposed to be labeled as PM reductions? They're listed as PM emissions right now.

CONSULTANT UNNASCH: Yeah, I'm sorry --

SPEAKER TURNER: So the negative reductions are --

CONSULTANT UNNASCH: Yeah, you're right, they're emission reductions. The blue bars are emission reductions.

SPEAKER TURNER: Okay.

CONSULTANT UNNASCH: So in the simplest case, you're using less gasoline, you're reducing

particulate.

SPEAKER TURNER: Okay. So the bars, though, below the S axis here or the zero axis, are actually increases to the negative reductions.

CONSULTANT UNNASCH: Right.

SPEAKER TURNER: Okay. I just wanted to make --

CONSULTANT UNNASCH: That's a great comment, and I have a feeling in the report those terms might be upside down.

SPEAKER TURNER: Yeah. Okay, thanks.

CONSULTANT UNNASCH: Or labeled differently.

SPEAKER ASHBY: I'm Tony Ashby with Sierra Research, and probably everybody else in the room knows the answer to this.

But on your slide number 26 in the last bullet, or the head, it says calculating NPV. What is NPV? I can't find it anywhere.

CONSULTANT UNNASCH: Oh, net present value.

SPEAKER ASHBY: Thank you.

CONSULTANT UNNASCH: So that's basically taking the time value of money into account.

SPEAKER ASHBY: Yeah. Thank you.

PRESIDING COMMISSIONER BOYD: This is a contest on who is going to speak first, one of you or one of us. No other questions? Or everybody has got to go back and study their economics a little more.

(Laughter.)

ARB CHAIRMAN LLOYD: Yes. It seems quite a bit of discussion today is focused on vehicle technology, I guess. The only person I see in the room here representing the OEMs is Ben, and it looks as though Ben is not going to say anything.

UNIDENTIFIED SPEAKER: I was stealing his ear.

ARB CHAIRMAN LLOYD: I was mentioning, Ben, that a lot of the stuff we talked about today talked about vehicle technology, the different technologies, the conventional technologies, fuel efficiency. And yet, as far as I see, you're the only person representing the OEMs here. And I'm not sure whether that's -- I don't know what that says. I don't know whether there is no interest in this, or -- I realize that Honda is, you know, not in the alliance, so maybe it's a mass sit-out by the alliance gearing up for Monday, I'm not

sure.

MR. KNIGHT: Certainly, we're very committed to moving technology forward on many fronts and with several fuels, and I appreciate the concept that I'm hearing here of kind of a performance framework so that we can all find the best solutions.

ARB CHAIRMAN LLOYD: Oh, sorry, Chairman Keese was saying this isn't on the record. I guess we've got the speaker --

CEC CHAIRMAN KEESE: Do you mind? Were you going to say the same thing?

SPEAKER BEARD: No, I was just going to respond to Dr. Lloyd saying that no one was here, and I am indeed here.

CEC CHAIRMAN KEESE: Would you mind saying that on the record? Just for our record here.

PRESIDING COMMISSIONER BOYD: Ben, could you come up and say what you just said to the microphone, so it goes on the record?

(Laughter.)

PRESIDING COMMISSIONER BOYD: So we could hear it with all the other people in the --

CEC CHAIRMAN KEESE: Our recorder was

indicating that there was going to be a gap in the transcript here.

ARB CHAIRMAN LLOYD: And then also, and I don't know, maybe you can, can you also address the issue that, the assumption here that we're going to have this difference in hybrid technology cost for the next 50 years, 48 years. And that's the assumption there. Just if you -- I don't know whether you can comment on that from your viewpoint.

SPEAKER KNIGHT: I think the, and it showed up --

CEC STAFF FONG: Would you state your name and affiliation.

SPEAKER KNIGHT: Ben Knight with Honda, and I was glad to give a presentation at the first workshop on natural gas vehicles. And I would make a brief comment on that.

I think I just saw in the report a difference, an assumed difference in the efficiency of natural gas versus gasoline. And we find, and I know Argon Lab has found that they're within a couple of percent, so I would be glad to send some information on that. And if indeed that's an error, it could be corrected.

Regarding gasoline vehicles and for the general market, consistent with the report I think that the incremental technology advancements that affect the whole fleet tend to be most cost-effective and have the greatest impact. And, of course, Honda is also, in addition to advancing our general vehicles and their efficiencies, is working to introduce the hybrid vehicles you mentioned.

And personally, I don't like to see so much some of the definitions of these, whether it's a full hybrid or mild or this or that, I'd rather see either a very technical description of how it works or call it a high-efficiency hybrid, and maybe the Prius and the Insight and the Civic hybrid I think, in my mind at this point in time, are clearly high-efficiency hybrids. And you want to look at them in terms of their environmental performance, rather than what the fraction of motor power is or battery power.

To address your question --

ARB CHAIRMAN LLOYD: Then do we get into the ultra and the super-high-efficiencies?

SPEAKER KNIGHT: And I look forward to those also, and, in part, those will gain their

efficiencies from weight reduction. I think Honda's contracted for some very interesting work on safety research that indicates if you had a hundred-pound or even a greater weight reduction on every vehicle across the board, the net safety would not be impacted; when you consider all of the fatalities and injury rates, it would not be impacted.

So that's important, to take a holistic view toward safety in consideration. But certainly, weight reduction, whether it's part of a hybrid or part of a more traditional drive train, is very important.

To address your question, as I think I'm understanding it, as we understand it today, we do see an incremental cost premium for hybrid technology, even though we can downsize the engine significantly, sometimes even drop a cylinder and save some additional parts like an alternator, still it has an additional motor and electronics to control that and an energy storage device. So it really is two powertrains, so to speak, combined. And we do see an increment for that.

Certainly, we'd want to reduce that. We're working hard, along with suppliers

worldwide, to bring those costs down. But probably not in excess of, at least in the near term, not in excess of the fuel savings, the direct fuel savings at current gasoline prices. So although we'll work on the cost, along with suppliers, certainly incentives and any encouragement of the public can make a difference in bringing these vehicles to bear.

And I say that, given the public's vision of perhaps the fuel savings. They might only take into consideration the first four years or something, they have a more short-term view of it, rather than let's say the total life of the vehicle.

CEC STAFF FONG: Thanks, Ben.

PRESIDING COMMISSIONER BOYD: Ben, could I ask you a question, now that Alan teased you up here, and I don't see the gentleman from the CHP in the audience anymore, and this is something I wished I had said when he was up here.

Because he made the comment about small is dangerous or, you know, lighter weight is dangerous. And I just wondered if you folks have an opinion on that. I was going to suggest to Alan that he might have his staff send to the CHP

the equivalent amount of data there is on smaller can be safe, construction-wise, and I just wondered if you had any comment on that as well.

SPEAKER KNIGHT: We certainly believe that small is not unsafe and, in fact, have gone all out with the Civic series, which is the first compact car to show off five-star frontal crash safety; also, the side. And I'm talking about end-cap performance, this is beyond the standards, showing off five-star safety. And in dynamic side-crash end-cap vehicle performance, four-star safety which, regardless of vehicle class, is really outstanding levels.

What we've done is about a month ago made public a study that we commissioned by an outside group. It looks at, is based on a NHTSA framework, a very credible NHTSA framework that's referred to in the National Academy of Science NRC study. And it takes that framework and updates it with even more vehicles covering a range of about 15 years' worth of vehicles.

And one of the assumptions it makes is to look at what if all vehicles, through weight-reduction technology, were down-weighted 100 pounds across the board? And within statistical

significance, there is no change in the net safety, net fatalities in society.

So this looks across at rollovers and hitting pedestrians, car to car, cars going off the road, all of those factors. For some of these factors, the small car actually has some benefits, including maneuvering or avoiding an accident. But all of those are accounted for in the study. I do believe NHTSA may also update their database and take another look, but this was based on the Kahane study of a couple of years ago.

PRESIDING COMMISSIONER BOYD: Thank you.

CONSULTANT UNNASCH: I have a -- My memory came back to me regarding one of the comments on offsets and reclaim. I just wanted to point out that something else that the economic analysis ought to consider is that the utilities are somewhat interested in electric vehicles because of their ability to charge at night where they would allow for better utilization of capital, load management, time of use, perhaps vehicle-to-grid load buffering, and the costs of purchasing offsets, albeit from other industries, might well be offset by benefits to the rate-payers that load management could provide.

PRESIDING COMMISSIONER BOYD: Thank you. The gentleman we drove away from the podium a moment ago -- Thank you for allowing us to interrupt you.

SPEAKER BEARD: That's quite all right.

My name is Loren Beard. I represent Daimler Chrysler. I didn't have any prepared comments, but since Dr. Lloyd suggested that we have no interest in these proceedings in Detroit, I wanted to assure you that we have a lot of interest in these proceedings in Detroit.

ARB CHAIRMAN LLOYD: Thank you, Loren.

SPEAKER BEARD: I'll make a couple of comments and I refer back, and I don't know if everyone has their handout in front of them, but on slide number 18 from the Task 3, which would be on page nine of your handout which showed the fuel displacement options, it's curious to me that we show, the bottom two bars are for light-duty diesels and shows the -- needs some development.

And it kind of falls into the same sort of group as gasoline reformer fuel cell needs -- Yeah, this is the slide -- needs some development. This slide kind of concerns me because it sort of qualitatively and quantitatively suggests, and I

apologize to Dan already that I haven't -- I've been out of town for a while and I haven't downloaded and read the report in its completion, detail. We would look at that and say there's some kind of disconnect in that, that we understand and we would be the first to observe that the California vehicle emissions represent a very significant hurdle, perhaps an insurmountable hurdle to the participation of the light-duty diesel in the California fleet, although we have not given up and we will not give up.

However, and maybe I sat through too many PG&E meetings, but the conclusion of the PG&E meeting, and maybe what this slide gets about or maybe that's why I'm confused by this slide or concerned about this slide, is that the PG&E meeting talked about what kinds of technologies would be available to significantly impact fuel use across the US fleet in the short- to mid-term, by which we intended to mean 15 to 20 years. And the conclusion was that the diesel, the light-duty diesel engine was the hands-down winner.

Now, in the long, long haul by which it doesn't define but which means maybe 40 or 50 years, then perhaps the fuel cell becomes the

winner. But I'm a little bit troubled by these, and maybe it's simply to say that they need some development. We have light-duty diesel engines that meet the year '04 standards today, in minivans and Jeeps and the PT Cruiser. And we fully anticipate meeting the year '05 standard, and we will be doing our very, very best to meet California standards for those vehicles.

We see those as, again, difficult and perhaps insurmountable but we hope not, but we anticipate those things happening if we hit a couple of home runs in a decade, not in three or four decades. So I just -- That was a concern I had.

The other concern, and I think it was a little bit of a -- it kind of struck right into my heart when I think Dan said, well, 35 miles per gallon in 2008 is a no-brainer, and that's always a little bit concerning to us. We market a car today that gets 35 miles per gallon, the Dodge Neon, and lo and behold, when people come into Dodge dealerships, they rarely drive out in them.

So I would suggest to the people here, in all seriousness, that if you don't fashion a policy which fully incorporates consumer

attitudes, consumer desires, that policy will fail. Consumers have to put some value on fuel economy; otherwise, they're not going to pay for it.

We talked about a hybrids a little and I'm not going to comment on the incremental cost for hybrids except that we know that there is one. And if we don't get consumers to value fuel economy, they're not going to pay for it and we're not going to move the ball forward, because we can produce a car today that gets 35 miles per gallon, but we can't sell a fleet that gets 35 miles per gallon.

So unless you had questions for me, that's --

ARB CHAIRMAN LLOYD: Yeah, I had a couple, Loren. I don't recollect the PG&E being that pessimistic on fuel cells or that optimistic on diesel, but maybe time has changed their views on that. And I certainly don't recollect Dr. Panic being as pessimistic as 40 or 50 years. I realize that may be difficult for you to comment on.

SPEAKER BEARD: I recall Dr. Freel saying that there is not much that Chevron and

Texaco can do to him at this stage of his career. Well, there are some things that Daimler can still do to me, so --

(Laughter.)

SPEAKER BEARD: -- so you may not want to share my comments with Dr. Panic, and if Dr. Panic has some views, that's fine. I happen to represent a part of the company that produces internal combustion engines.

ARB CHAIRMAN LLOYD: Well, and again, in all honesty, the comment here, and I said earlier, given the progress that the industry has made, while it's a challenge in California, we expect that you'll meet that challenge sometime in the future.

SPEAKER BEARD: We expect to as well.

PRESIDING COMMISSIONER BOYD: Could you comment on staff's assumptions about the cost differentials for light-duty diesels that were mentioned earlier in Mr. Fong's presentation?

SPEAKER BEARD: Again, I guess I would defer a little bit and we will provide some written comments. And the reason that I'm doing this is not to dodge a question, but I was in Texas all of last week and just got a chance to

download the thing and I have not read the entire report. And before I made some comment that was taken the wrong way.

As I just glance at the numbers, they seem to be in the right ball park, but I would rather take my time to read the report in detail, and then comment in a written fashion.

ARB CHAIRMAN LLOYD: Thank you.

PRESIDING COMMISSIONER BOYD: Excuse me, not -- I don't expect you to comment on this, but a comment was made to me that reminded me of something that -- I agree with your comment about what the behavior of the buying public is. You put a little car out there and they drive off in a Durango.

The trouble -- One of the problems I have, though, is I see a lot of Durango ads on TV and few if any Neon ads. So the public will respond to, sometimes to where they're pointed. But I would agree, as long as gasoline is cheap, they're going to go for other factors. And that's an issue we tend to deal with.

SPEAKER BEARD: And I would like to comment on that in that as I look around, I see people wearing fashions that perhaps they don't

need to wear.

PRESIDING COMMISSIONER BOYD: Touche.

SPEAKER BEARD: You know, a suit that perhaps cost more than is necessary for the climate that you have here. And I, not that my personal life matters, but I happen to own a 60-inch TV, whereas ten years ago I owned a 40-inch TV.

(Laughter.)

SPEAKER BEARD: But it's not necessary. My eyes are just as good as they were then, but now I can afford one. I don't think that Mitsubishi talked me into it, but I happened to buy it.

Now, the consuming public is going to buy a car, and we're going to advertise to them. You know, that's something that our advertising department makes decisions on, on a business case. But I would suggest that the American public tends to consume a lot of things that they don't necessarily need.

Now, having said that, I'm not sure how many people who buy Dodge Durangos need them and how many just want to make a fashion statement, but given that some of the people who buy them

truly want to go through the Donner Pass and go up to Tahoe and go skiing or whatever it is that you folks do up there, those people probably get some benefit out of having a Durango or a Grand Cherokee as opposed to a Neon.

And so we have to build that Dodge Durango in order to incorporate, in order to meet its 99th-percentile function, just as the man from the Highway Patrol said don't include us when you start talking about fuel economy, don't include us because we have to go fast and we have to catch bad guys. Well, we have to build cars for those people that intend to drive through deep snow, and we don't give them a questionnaire when they come to the dealership that says are you going to drive this car through the deep snow because if you're not, we're going to sell you a Neon.

(Laughter.)

PRESIDING COMMISSIONER BOYD: Well, touche. I'm a native North Californian and I have a four-wheel drive, and I drive in the snow all the time so I feel legitimate, but a lot of those cars going by me are en route to Reno or something and they just want to go gamble. The public will do what the public will do, it's just -- it's a

dilemma.

I also didn't want to remind the gentleman from the Highway Patrol of -- and I'm looking at Tom Cackette now when I say this -- of the experience that we had years ago with the Highway Patrol, pleading with them not to seek legislation to authorize them to rip their catalysts off their cars because it obviously interfered with their performance. So mythology carries on, and we all have to deal with it.

But now that he left the room, I'm doing it to him, so --

(Laughter.)

PRESIDING COMMISSIONER BOYD: Thank you.

ARB CHAIRMAN LLOYD: And again, thanks for coming out from Detroit, Loren, and I apologize and say that you've done a good job of representing the industry there.

SPEAKER BEARD: Thank you.

SPEAKER PHILLIPS: I'm Kathryn Phillips with the Center for Energy Efficiency and Renewable Technologies. When I first started working there I had to stand in front of a mirror for about an hour to be able to say that without stumbling.

I just want to comment a little bit on what Ben said and Loren said, actually more on what Loren said. I can see that -- I understand why people are going into the dealerships and looking at the Neons but going with the Durangos. They're two entirely different vehicles that offer two entirely different options: a large truck that you can take to areas that you probably wouldn't want to go to in a Neon, although I'd like to point out to Ben that I've done -- some of my happiest moments of off-roading have been in a Civic hatchback, so it can be done.

What I want to point out, though, is that the auto makers can improve the technologies on these SUVs, and last summer the National Academy of Sciences, their panel looking at the CAFE standards, suggested that auto makers could increase the fuel efficiency of cars, pickups, sport utility vehicles and vans by 16 to 47 percent over the next 10 to 15 years using existing technologies.

We also know from some recent Energy Foundation polls, one released in February, that Californians want fuel efficiency requirements on SUVs. I think all of this boils down to the

fact -- Well, and also, one more thing. A J.D. Power survey recently released showed that consumers want fuel-efficient and advanced technology vehicles. So consumers want these things. The technology is there to improve the fuel efficiency in these larger vehicles.

And if the auto maker stepped up to the plate and did what is technically possible, and some might say the socially responsible thing to do, the thing that a good corporate citizen would do, I think that we'd be able to resolve or at least get a quick start on our efforts to reduce petroleum dependence in California. Thank you.

SPEAKER JONES: My name is Pam Jones, Diesel Technology Forum. And when I was in graduate school I determined that the policy-wolicy people had a lot more fun than the quantoids --

(Laughter.)

SPEAKER JONES: -- so I'll comment from the policy-wolicy angle of the Diesel Technology Forum.

During the report there are some assumptions and speculations about whether or not the engine manufacturers, car companies will meet

the emissions standards. Also, whether or not in-use numbers are different than certification. And I'd like to suggest that there be minimal speculation on this and just accept the fact that we are not asking for a lessening of the standards, a lowering of the standards. The standards are what they are: Either we meet them or we don't.

And the same is true of other technologies, fuel cells. When the price comes down, there will be a market for them. If the price doesn't come down, there will not be a market for them. So perhaps less speculation and just accept that the standards are there. We are doing our best to meet them.

Second area was some reference to Europe having less stringent standards. And perhaps the comment could be made that they're not less stringent as much as focused on a different emphasis, and that's on the CO2 issue and global warming. That happens to be their priority, so it's not that they're less stringent, it's a different emphasis on there.

ARB CHAIRMAN LLOYD: Well, in terms of NOX, they are less stringent, and that's a fact.

SPEAKER JONES: Right, but in terms of --

ARB CHAIRMAN LLOYD: But the strategy that they're following is different, I agree.

SPEAKER JONES: Right, right.

Third, in the report there is reference to diesel as being what seems like to be the primary source of PM, and we'd just like to ask that there be a consideration of all sources of PM, and I think that you will be doing that.

The new weekend ozone study is calling into question the relationship between NO2 and ozone. And by that I mean the study shows something probably paradoxical that on the weekends, when you would expect the NO2 levels to go down, in fact they are going up. So basing some of the information standards on that may be questionable because we don't really know the relationship between NO2 and -- I mean, NOX and ozone. There is some question to that, as evidenced by that study.

And lastly, the reference to the SUVs and the luxury vehicles that you were just speaking about. The report really doesn't address that perhaps as much as it could. It's looking at

the smaller vehicles and the larger vans. But from the practical point of view, the SUV is probably where you would find the biggest difference, both in fuel efficiency and willingness of consumers to pay the additional cost. Four thousand dollars out of a $45,000 vehicle is certainly less relative to a smaller vehicle that's $20,000. So I think you would have more likelihood of willingness to pay for that.

Second, as has been mentioned, it would provide the reductions, yet still providing the look, the feel, the performance, and yes, the weight that many of those consumers want. And if you do reduce the weight, they will go off and choose some other vehicle, if that's how you want to reduce the fuel consumption of the SUVs. They'll choose other vehicles if you change the cars too dramatically.

Lastly, I would just like to say it's the end of March, one month to D-day when the report is due, and I'm still able to speak to you today because clean diesel technology is still in the report. And we appreciate your consideration, that it is still in the report, and just acknowledging the contribution that this

technology has for providing cost-effective low-infrastructure technology and one that would have little subsidies required from the government in order to reduce petroleum consumption. Thank you.

ARB CHAIRMAN LLOYD: Pam, I just would be remiss as an atmospheric scientist to say there's any doubt about the relationship between NOX and ozone in the atmosphere. I think there are many factors there. I don't think you really meant that, but I understand the issue.

SPEAKER JONES: Right, but I think that weekend ozone study is calling into question what the relationship and why it is not --

ARB CHAIRMAN LLOYD: For years the issue has been argued that if you cut back NOX too much, ozone goes out. We know that's a fact, but the point is there are other issues associated with NOX in terms of health effects, and that line of discussion to me is meaningless.

It's interesting in understanding what's going on, but to use that as a rationale for this report, it's not germane.

SPEAKER JONES: Thank you.

SPEAKER NEANDROSS: Good afternoon. Erik Neandross again with Gladstein and

Associates.

I apologize, I missed the presentation, but was interested. I flipped through the slides and it looks like the only environmental consideration is for emissions.

CONSULTANT UNNASCH: No. In Task 1 there is air emission impacts and there's what we call multimedia impacts, and those include spills due to the transportation of fuels and also other types of multimedia impacts, oil changes, that sort of thing.

SPEAKER NEANDROSS: So the cost to the government, cost to the public is considered for land, air and water?

CONSULTANT UNNASCH: Right.

SPEAKER NEANDROSS: Okay, thanks. That's all I have.

PRESIDING COMMISSIONER BOYD: Well, have we reached the end? Not bad, not bad.

ARB CHAIRMAN LLOYD: It's not 1:45 yet is what he's saying.

(Laughter.)

PRESIDING COMMISSIONER BOYD: We have one of those a year.

If there is no one else who would like

to step forward, then I want to first thank everybody for their attendance and their participation. The agenda calls for me to make closing remarks, and they're going to be just brief and, as I'm saying, to thank the staffs of the agencies, our consultants, and the audience for their participation in this and your indulgence and your patience.

I urge you and encourage you to provide written submissions by the deadlines that were laid out, and anybody who needs a copy of the printed report and doesn't want to download the thing, I'll donate my copy up here to you. I know I have trouble reading these things on the screen as well.

This has been a very good workshop. In previous workshops I've made lengthier closing remarks because there have been fewer people with the courage to come to the microphone, and I've tried to summarize some of the issues for people to address in their written testimony. This workshop we had good participation, I appreciate that. Coupled with the fact that I am truly running out of voice.

I again will thank everybody and bid you

adieu. I thank my fellow panelists here and wish everybody a nice spring weekend and look forward to seeing you at the next workshop, which I believe is April 15th. Okay, thank you everybody and be safe out there.

(Thereupon, the hearing was adjourned at 3:45 p.m.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission public hearing; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 15th day of April, 2002.